

PROGRESSIVE MEDICINE





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1912

CLARK, JOHN G., M.D.

COLEY, WILLIAM B., M.D.

GERSTER, JOHN C. A., M.D.

JACKSON, EDWARD, M.D.

STENGEL, ALFRED, M.D.

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PROGRESSIVE MEDICINE

A QUARTERLY DIGEST OF ADVANCES, DISCOVERIES
AND IMPROVEMENTS

IN THE

MEDICAL AND SURGICAL SCIENCES

EDITED BY

HOBART AMORY HARE, M.D.

PROFESSOR OF THERAPEUTICS AND MATERIA MEDICA IN THE JEFFERSON MEDICAL COLLEGE OF PHILADELPHIA; PHYSICIAN TO THE JEFFERSON MEDICAL COLLEGE HOSPITAL; ONE TIME CLINICAL PROFESSOR OF DISEASES OF CHILDREN IN THE UNIVERSITY OF PENNSYLVANIA;
MEMBER OF THE ASSOCIATION OF AMERICAN PHYSICIANS, ETC.

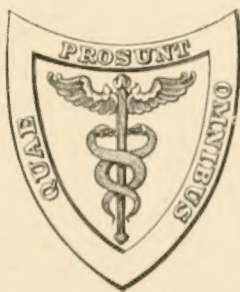
ASSISTED BY

LEIGHTON F. APPLEMAN, M.D.

INSTRUCTOR IN THERAPEUTICS, JEFFERSON MEDICAL COLLEGE, PHILADELPHIA; OPHTHALMOLOGIST TO THE FREDERICK DOUGLASS MEMORIAL HOSPITAL; INSTRUCTOR IN OPHTHALMOLOGY, PHILADELPHIA POLYCLINIC HOSPITAL AND COLLEGE FOR GRADUATES IN MEDICINE.

VOLUME II. JUNE, 1912

HERNIA—SURGERY OF THE ABDOMEN, EXCLUSIVE OF HERNIA—GYNECOLOGY—
DISEASES OF THE BLOOD. DIATHETIC AND METABOLIC DISEASES.
DISEASES OF THE SPLEEN, THYROID GLAND, NUTRITION, AND
THE LYMPHATIC SYSTEM—OPHTHALMOLOGY.



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LIST OF CONTRIBUTORS

JOSEPH C. BLOODGOOD, M.D.,

Associate Professor of Surgery, Johns Hopkins University, Baltimore, Md.

CHARLES W. BONNEY, M.D.,

Assistant Demonstrator of Anatomy in the Jefferson Medical College, Philadelphia.

JOHN ROSE BRADFORD, M.D., F.R.C.P., F.R.S.,

Professor of Medicine in University College and Physician to the University College Hospital, London.

JOHN G. CLARK, M.D.,

Professor of Gynecology in the University of Pennsylvania, Philadelphia.

WILLIAM B. COLEY, M.D.,

Professor of Clinical Surgery, Cornell University Medical School; Attending Surgeon to the General Memorial Hospital; Attending Surgeon to the Hospital for Ruptured and Crippled.

FLOYD M. CRANDALL, M.D.,

Consulting Physician to the Infants' and Children's Hospital; Late Visiting Physician to Minturn Hospital, New York.

EDWARD P. DAVIS, M.D.,

Professor of Obstetrics in the Jefferson Medical College of Philadelphia.

ARTHUR B. DUEL, M.D.,

Professor of Otology, New York Polyclinic Medical School and Hospital; Aural Surgeon to the Manhattan Eye, Ear, and Throat Hospital, and to the Polyclinic Hospital; Otologist to the Babies' Hospital; Consulting Aural Surgeon to the Skin and Cancer Hospital, and to the New York Health Board Hospitals.

WILLIAM EWART, M.D., F.R.C.P.,

Consulting Physician to St. George's Hospital and to the Belgrave Hospital for Children, London.

CHARLES H. FRAZIER, M.D.,

Professor of Clinical Surgery in the University of Pennsylvania; Surgeon to the University, Howard, and Philadelphia Hospitals.

JOHN C. A. GERSTER, M.D.,

Instructor in Surgery, New York Polyclinic Hospital and Medical School;
Attending Surgeon to the University and Bellevue Hospital Medical School's
Clinic; Assistant Attending Surgeon to the City Hospital (Blackwell's
Island).

WILLIAM S. GOTTHEIL, M.D.,

Adjunct Professor of Dermatology, New York Post-Graduate Medical School;
Consulting Dermatologist to Beth Israel and Washington Heights Hospitals;
Visiting Dermatologist to the City and Lebanon Hospitals, New York City.

EDWARD JACKSON, M.D.,

Professor of Ophthalmology in the University of Colorado; Ophthalmologist
to the City and County Hospital of Denver.

H. R. M. LANDIS, M.D.,

Director of the Clinical Department of the Phipps Institute of the Univer-
sity of Pennsylvania; Associate in Medicine, University of Pennsylvania;
Visiting Physician to the White Haven Sanatorium.

R. S. LAVENSON, M.D.,

One time Instructor in Medicine in the University of Pennsylvania.

JOHN RUHRÄH, M.D.,

Professor of Diseases of Children and Therapeutics, College of Physicians
and Surgeons; Visiting Physician, Robert Garrett Hospital, Nursery and
Child's Hospital, Mercy Hospital; Consulting Physician, Church Home
and Infirmary, Baltimore.

WILLIAM G. SPILLER, M.D.,

Professor of Neuropathology and Associate Professor of Neurology in the
University of Pennsylvania; Clinical Professor of Nervous Diseases in the
Woman's Medical College of Pennsylvania.

ALFRED STENGEL, M.D.,

Professor of the Theory and Practice of Medicine and Clinical Medicine in
the University of Pennsylvania, Philadelphia.

GEORGE B. WOOD, M.D.,

Surgeon to the Department of the Nose, Throat, and Ear, Howard Hospital;
Assistant Laryngologist, Orthopædic Hospital.

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PROGRESSIVE MEDICINE

JUNE, 1912

HERNIA

BY WILLIAM B. COLEY, M.D.

Crural Hernia. Reich,¹ of the Tübingen Clinic, strongly recommends the inguinal radical operation for crural hernia, the merits of which he believes are not sufficiently recognized. After reviewing the shortcomings of the various methods of operation for crural hernia now in vogue, he describes his own modifications of the inguinal radical operation (Bassini) for crural hernia, the various steps of which are well demonstrated by the accompanying illustrations. The chief advantages of the method he believes to be the following: (1) The peritoneal pouch is thoroughly eliminated; (2) The examination and disposition of the contents of the sac are absolutely reliable; (3) the crural canal is eliminated in its entire length by the formation of a double muscular wall capable of great resistance; inwardly, expanding with abdominal pressure; outwardly, forming an aponeurotic ligamentous wall closing the external ring; (4) simultaneously with the femoral canal, the inguinal canal is reliably closed so that the operation of the crural hernia does not furnish a disposition for the development of an inguinal hernia.

Reich points out the greater simplicity of this method as compared to others of equal value. He states that he is unable to give any data as regards permanent results inasmuch as he has practised the method only since 1910.

My objection to this operation has already been stated in previous articles in *PROGRESSIVE MEDICINE*. Such procedures are much more complicated, and there is at present no data to show that they are superior, or even equal in efficiency, to methods that have already stood the test of time.

At the hospital for Ruptured and Crippled we have performed 141 operations for femoral hernia by the simple method of high ligation of the

¹ Beitr. z. klin. Chir., 1911, Band lxxiii, Heft 1.

sac followed by closure of the canal with purse-string suture of kangaroo tendon, without a single relapse. I have also operated outside of the hospital upon more than 100 cases, with only one relapse.

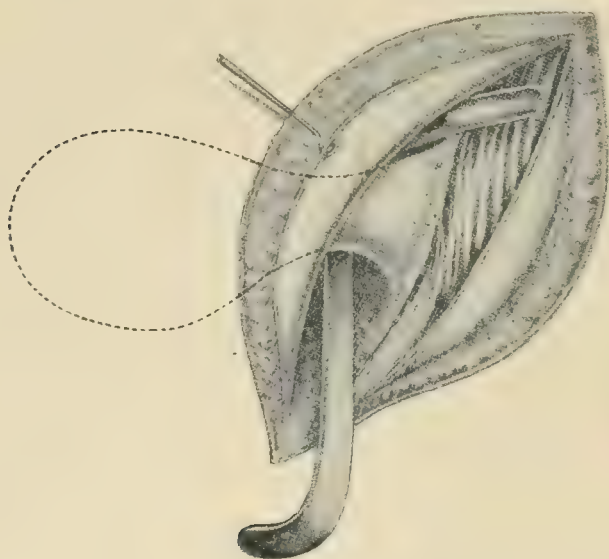


FIG. 1

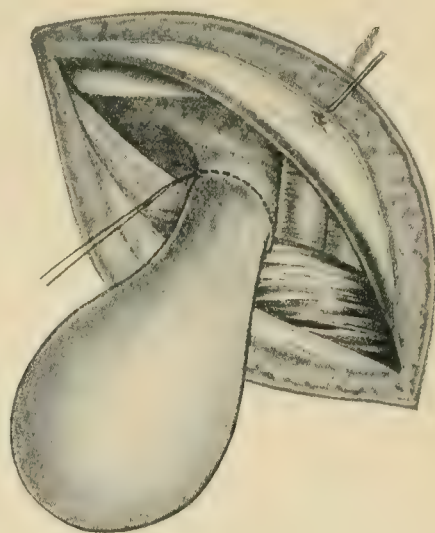


FIG. 2

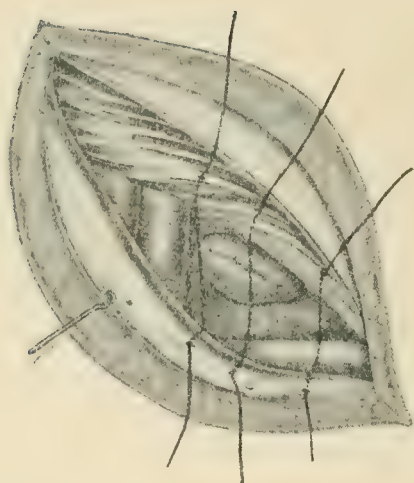


FIG. 3

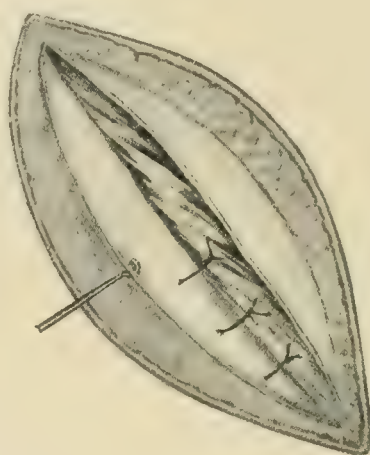


FIG. 4

Inguinal Hernia. Martin Du-Pan¹ publishes 58 cases of inguinal hernia in children operated upon according to the method of Lorthioir, of Brussels. The original part of this operation consists in resection of the hernial sac as high as possible without opening the inguinal canal, allowing the upper end of the sac to remain free without suture or ligature. The reason given for this procedure is that, in cases of recurrence after operation with suture of the stump, the scar of the sutured portion was found at the distal end of the new sac, suggesting that the suture had produced a depression which favored a recurrence. By not tying off the sac, it is assumed, this depression will be avoided. A 2 centimeter incision only is made over the external ring; only in

¹ Revue Médicale de la Suisse Romande, November 20, 1911.

large hernias is any suture of the canal attempted, and in such cases only one or two catgut sutures are introduced to unite the pillars.

This operation seems to me to be a distinct step backward, and I am sure that, if the cases operated upon by this method are traced sufficiently long, we shall find the same high proportion of recurrences that followed the operations of twenty years ago. In the first place, I believe the procedure is based upon illogical grounds. It is impossible to make a high resection of the sac without opening the inguinal canal. In many cases in children, and in practically all adult cases, a cure depends largely upon a careful closure of the canal. The simplicity of the operation should carry little weight, inasmuch as the Bassini operation in children, if properly understood, can easily be performed in ten minutes or less.

Hydrocele in the Female. The *Beiträge zur klinische Chirurgie*, (Band lxxvii, April, 1910) contains a contribution by P. P. Klemens on the subject of "Hydrocele in the Female." He reports 7 cases successfully operated upon at Wöfler's Surgical Clinic since 1895, being 1.04 per cent. of the total number of cases of hernia observed at the clinic during this period, and 1.14 per cent. of all cases of hernia operated upon.

Finsterer, in his work "Contribution to the Knowledge of Hydrocele Muliebris," reports 89 such cases.

Klemens states that hydrocele in the female usually presents a transparent tumor the size of a hen's egg, formed by an open vaginal process of peritoneum which has become firmly attached to the round ligament in the inguinal region; it generally contains serous exudate. He states that the subjective symptoms are similar to those of a hernia; the condition may also produce incarceration. I have observed a large number of cases of hydrocele in the female, but have never known of an incarceration.

Total extirpation of the sac, he holds, is the operation indicated.

Silver Wire for the Closure of Hernial Apertures. My opinion, expressed from time to time in PROGRESSIVE MEDICINE, particularly in the last number, as regards the advisability of using silver wire filigrees for the closure of hernial openings, is further confirmed by an article of Riem's¹ entitled "The Fate of Implanted Silver Wire Net for the Closure of Hernial Openings," in which he reviews the final results following the implantation of such silver filigree. On basis of his observations, he concludes that the hope that these silver wire nets permanently retain their form and firmness and thus furnish a means of mechanical closure of the weak point in the abdominal wall, has not been realized. He shows that the silver wire is gradually affected by the hydrogenous juices of the body, causing the metal to erode and break. The fact

¹ Arch. f. klin. Chir., 1910, vol. xciii, Heft 4.

that these nets are usually imbedded in strong scar tissue often prevents injury from the free wire points. However, the possibility of their becoming a direct danger does not, by any means, seem to be excluded.

The x-rays have shown that such nets may wander; they may descend and thus cause injury to the large vessels (external iliac artery and inferior epigastric artery) by the projecting ends of the wire. They may also injure other organs, such as the urinary bladder or intestines. In addition, it must be admitted that the removal of such broken, deeply imbedded, wire nets is by no means an easy task.

From all this, he states, it is clear that the wire net is not an ideal means of closure, and that the method should be employed only in exceptional cases, *i. e.*, cases in which Trendelenburg's bone implantation is not feasible.

Ventral Hernia. The closure of large herniæ, especially ventral hernia, with free transplantation of periosteal flaps, has been recently described by König.¹

He has used the procedure 15 times (14 women, 1 man), of which 1, the smallest, was an epigastric hernia; 3 were large umbilical herniæ that had not been previously operated upon; 10 were postoperative, cicatricial herniæ, 8 of these in the linea alba, some of which had recurred several times before. In 1 of the cases, a multilocular, recurrent, umbilical hernia in a very stout woman, aged sixty-three years, the hernial opening was 35 cm. wide. All operations, with the exception of 1, were performed between the summer of 1908 and August, 1910. Later examinations showed no recurrences.

For a detailed description of the method I would refer to the original article. He takes his periosteum flaps from the tibia and—as he calls it—"solders" them into the hernial opening.

PREVENTION AND TREATMENT OF VENTRAL HERNIA. *Surgery, Gynecology, and Obstetrics*, February, 1912, contains a very important article by Dr. E. S. Judd, on "The Prevention and Treatment of Ventral Hernia."

Judd states that infection is the chief cause of hernias which occur in operative wounds. With this opinion I thoroughly agree. Judd further states that in a study of a large number of cases which occurred in Mikulicz's clinic, infection was found to be the cause of the hernia in the greater number. The giving way of a wound which was healed by primary intention is seldom seen. Judd states that many times they have been tempted at St. Mary's Hospital to remove an adherent appendix through a right rectus incision, which was made primarily for a gall-bladder operation, but in doing so, it would be necessary to continue the rectus incision several inches downward severing one or more of the important nerves, which may cause the muscle to atrophy

¹ Beitr. z. klin. Chir., 1911, Band lxxv, Heft 3.

and thus allow a hernia to develop. He advises a separate split-muscle incision for appendectomy in such cases, instead of the prolonged rectus incision. In making median insisions, he believes it much better to open the sheaths of both recti muscles and close the incision by bringing the muscles and their sheaths, respectively, together in the midline

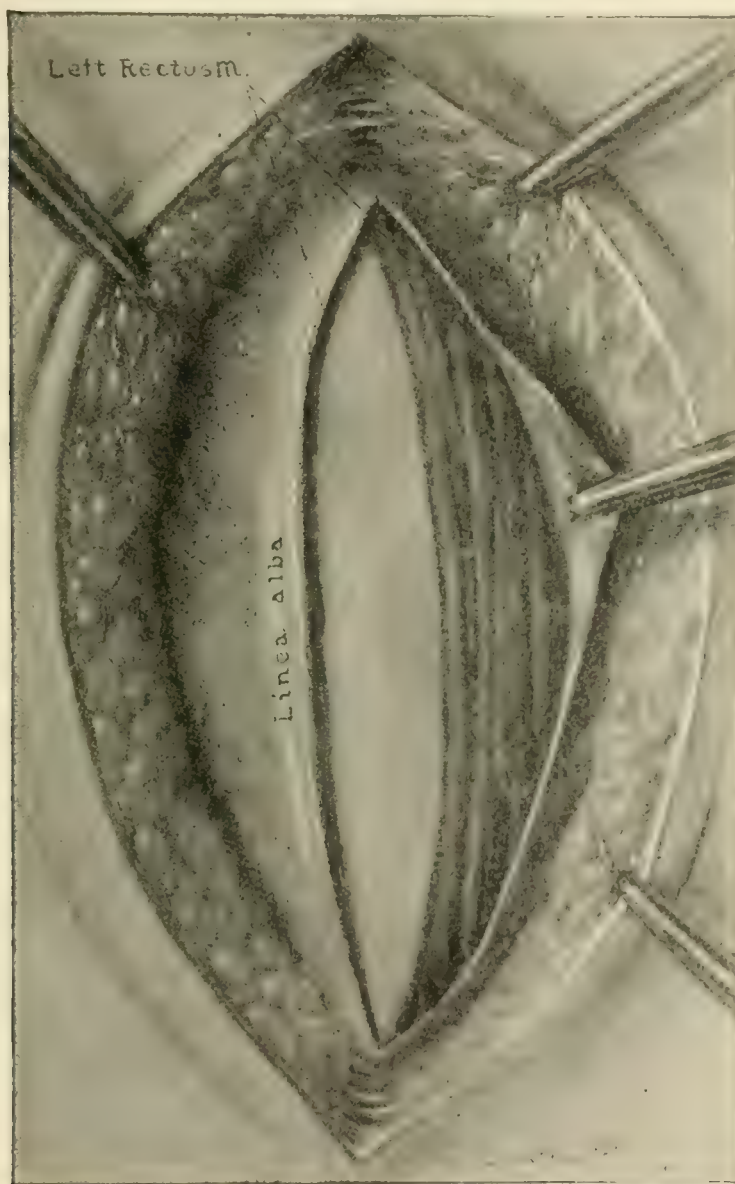


FIG. 5.—Midline incision for pelvic cases, showing incision slightly to the left of the linea alba, through the rectus muscle of the left side. A few fibers of the muscle on one side of the incision and the main body of the muscle on the other. (Judd, in *Surgery, Gynecology, and Obstetrics*.)

(Figs. 5 and 6). An incision made through the aponeurosis of the external oblique can be closed with a better degree of strength if the aponeurosis be imbricated. By overlapping the aponeurotic flaps face-to-face, instead of edge-to-edge, a retraction of the aponeurotic flaps is avoided. They have employed this method of closure in several

thousand operations in St. Mary's Hospital and only one hernia is known to have developed.

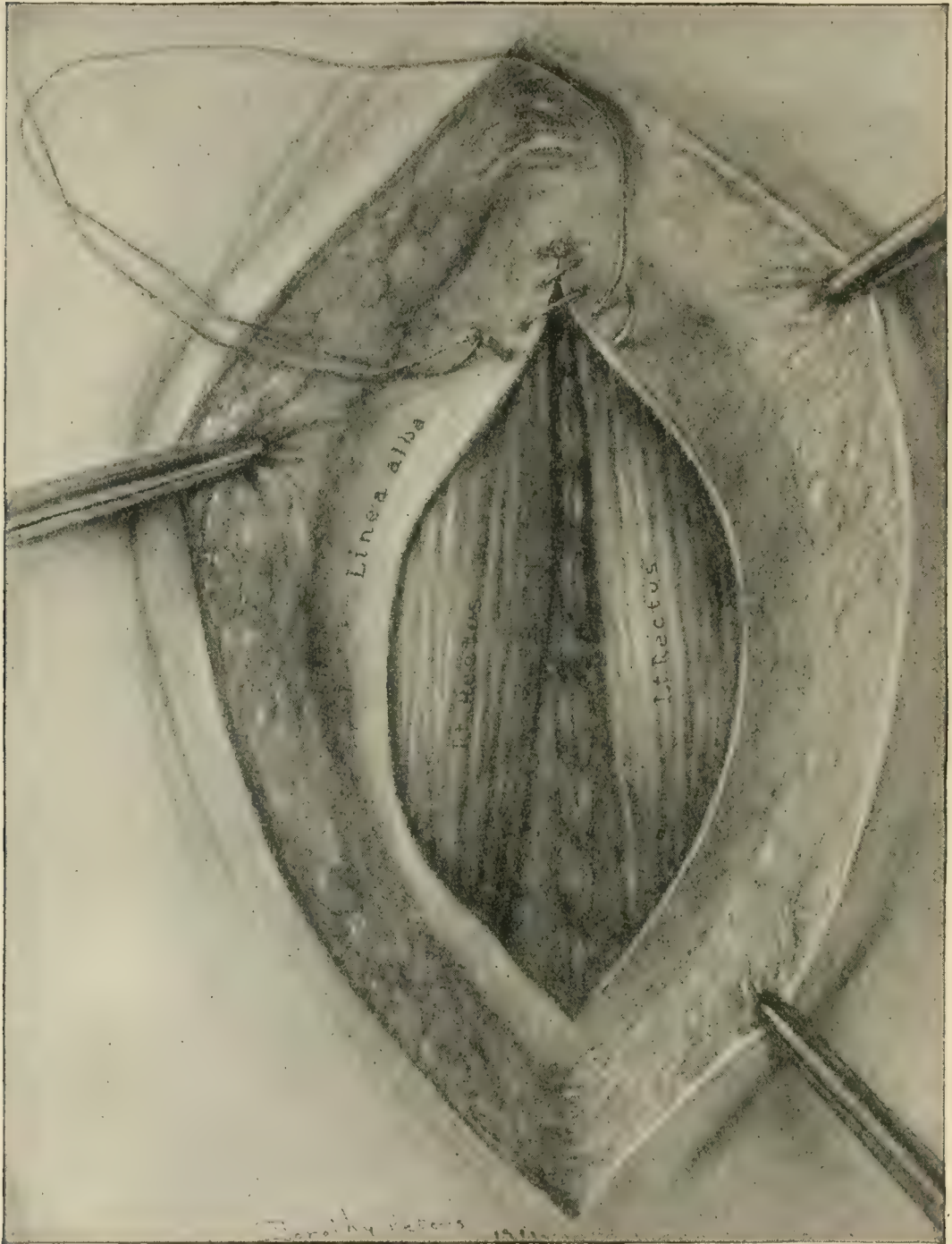


FIG. 6.—Sheath of the rectus muscle of opposite side open so that the two recti muscles can be sutured together. (Judd, in *Surgery, Gynecology, and Obstetrics*.)

Hernia the Result of Injury to Nerves. The importance of not injuring the nerves when operating for appendicitis is strongly emphasized by J. P. Hoguet in his recent papers on "The Nerve Supply of the Anterior Abdominal Wall and its Surgical Importance,"¹ and "Right Inguinal

¹ *Annals of Surgery*, August, 1911.

Hernia following Appendectomy.”¹ In a series of 190 cases of right inguinal hernia, observed at St. Luke’s Hospital, he found 8 with antecedent appendectomy, the time of the appearance of the hernia varying from two weeks to four years after operation; in the majority of these cases the appendicitis wound had been drained or an unusually large incision had been made. The reason for the appearance of these hernia is stated by Hoguet as follows:

“Practically all of the muscles in the region of the inguinal canal receive their nerve supply from the first lumbar nerve through its iliohypogastric and ilio-inguinal branches, the former supplying considerably more muscle, especially the lower part of the internal oblique and transversalis, commonly known as the conjoined tendon. The ilio-inguinal nerve is practically out of reach of the surgeon, emerging as it does just below Poupart’s ligament about one and a half inches internal to and below the anterior superior spine of the ilium. The iliohypogastric branch, however, is generally more than one inch above the preceding, and runs downward and inward between the internal oblique and transversalis muscles. It crosses a line drawn from the umbilicus to the anterior superior spine almost two inches above the latter. Although the ordinary McBurney incision would run roughly parallel to the nerve, it can easily be seen in what danger the latter is, even though the fibers of the internal oblique are separated and not cut. The twelfth dorsal nerve takes the same course more than one inch higher up and is generally double.

“Of course, many cases are seen in which there is not only a right inguinal hernia but also a hernia in the appendix scar. An example is given in one of the cases reported. This naturally ensues from the cutting of the nerve, so that the muscle on the inner part of the wound, being paralyzed, is so flaccid that it not only admits the passage of a ventral hernia, but also causes a certain amount of retraction of the internal oblique and transversalis from Poupart’s ligament, so that an inguinal hernia ensues.”

In conclusion, Hoguet states: “Of course, 8 cases out of 190 is not a large percentage, but the claim can justly be made that these are very conservative figures. It is very possible that there have been others out of the 190 who had trouble and who did not come back to St. Luke’s Hospital to be operated upon for the hernia, or the fact of the antecedent appendectomy might have been overlooked by the historian. Yet, to the author’s mind, this is a condition that really exists and, although recognized, enough attention has not been paid to it.”

Inguinal Hernia following Appendectomy. In the *Journal of the American Medical Association*, July 2, 1910, Pond publishes an article on “Inguinal Hernia following Appendectomy.” He states that as the

¹ *Annals of Surgery*, November, 1911.

number of operations for appendicitis has enormously increased, the sequelæ of all abdominal operations are also increasing and many patients, who do not die of the operation, are disabled, due to the ignorance or disregard of surgical or anatomical principles on the part of the surgeon. He states that one of the commonest sequelæ is hernia; when this is hernia of the abdominal wall or of the scar, it is usually the result of delayed union or improper suturing. When right inguinal hernia appears as a sequel to an appendectomy, he believes it can usually be ascribed to an infection of the abdominal wall, to destruction of the nervous supply of the inguinal canal, or, perhaps, to both. He states that the nerve supply of the right lower abdomen may be damaged by sepsis, or by ruthless disregard of the course of the nerves in outlining the incision.

Results of Operation. At the Hospital for Ruptured and Crippled, from December, 1891, to January, 1912, we have observed 3383 cases of hernia of the following varieties:

Inguinal hernia in the male:

Indirect	2470 with 20 = 0.81 per cent. recurrences.
Direct	10 without recurrences.

Inguinal hernia in the female:

Indirect	617 with 8 = 1.29 per cent. recurrences.
Direct	3 without recurrences.
Femoral	141 without recurrences.
Umbilical	74 with 3 = 4.0 per cent. recurrences.
Ventral	55 with 8 = 14.4 per cent. recurrences.
Epigastric	12 with 1 = 8.3 per cent. recurrences.
Lumbar	1 without recurrence.

The foregoing table shows 40 relapses in a total of 3383 cases of various types of hernia, which is equal to 1.18 per cent. recurrences.

Bassini's method was employed in 1859 cases of indirect inguinal hernia in the male, with 10 = 0.53 per cent. recurrences. The cord was not transplanted in 621 cases, with 10 = 1.61 per cent. recurrences.

In the direct inguinal hernia in the male, 10 in number, Bassini's method was used without any recurrences. The so-called "purse-string suture method" was employed for the femoral herniæ

For the umbilical hernia, Mayo's or the overlapping method was employed in 43 cases, with 1 relapse = 2.34 per cent.; the method without overlapping in 31 cases, with 2 recurrences = 6.4 per cent.

The total number of operations for hernia performed at the Heidelberg Clinic,¹ in 1910, was 451 in 398 patients, with 6 deaths.

Inguinal hernia: 224 men, 30 women, 36 children, with a total of 341 herniæ; 320 were free, 13 incarcerated, and 8 recurrent herniæ.

As regards operation, the Bassini method was employed in 269

¹ *Beit. z. klin. Chir.*, 1911, Band lxxv, supplementary number.

cases, Ferrari's in 41 cases. Primary union was obtained in the majority of cases; 7 left the clinic with a fistula; 1 death.

Crural hernia: 19 men and 43 women, with 28 free and 33 incarcerated herniæ, 4 deaths.

Umbilical hernia: 8 men, 12 women, and 5 children. It is stated that most of these herniæ were of large size. Operation, in the majority of cases, consisted in transverse suture of the separate layers.

Epigastric hernia: 7 men and 3 women.

Postoperative ventral hernia: 12 male, 12 female, and 2 children, 9 of which had been previously operated upon at other clinics. In 15 of the cases, the antecedent operation was appendectomy, 1 death.

Of the rarer types of hernia observed, there was 1 spontaneous lateral ventral hernia, 1 ventral hernia after an injury nineteen years ago, and 1 intersigmoid hernia.

In the December, 1910, issue of the *Beitr. z. klin. Chir.*, Hilgenreiner publishes a statistical survey of the hernia cases, 2238 in number, observed at Wölfler's Clinic from 1895 to 1910.

Of these, 1460 (65.2 per cent.) were free, 778 (34.8 per cent.) incarcerated herniæ. In the five years from 1895 to 1900, 272 free, and 258 incarcerated herniæ were operated upon; from 1900 to 1905, 597 free, and 264 incarcerated hernias were operated upon; from 1905 to 1910, 591 free, and 256 incarcerated herniæ were operated upon.

As regards the various types of hernia, it is stated that 1780 were inguinal (1494 male, 286 female); 311 were crural (36 male, 275 female); 65 were umbilical (8 male, 57 female); 43 were epigastric (35 male, 8 female); 39 were ventral and other types (14 male and 25 female).

It will be seen that the male sex predominates, representing 71 per cent. of the total number of cases.

Considering the different varieties of hernia separately, we find the male sex to preponderate only in the inguinal and epigastric, being 84 per cent. in the former, and 81.5 per cent. in the latter. In the other varieties, the female exceed the male cases as follows: Crural hernia, 88.5 per cent. female; umbilical hernia, 87.5 per cent. female.

Of 1460 operations for free hernia, 1245 were in the male and 215 in the female; while of 778 incarcerated hernia, 342 represent male and 436 female patients, showing that, while the female sex in the free herniæ represents about 15 per cent. of the total number, this percentage rises to 56 in the incarcerated cases. Most pronounced is this difference in the crural and umbilical variety; 224 of 244 cases of incarcerated crural herniæ being women, and 36 of 39 cases of incarcerated umbilical hernia; 126, or 58 per cent. of the total number of operations for free hernia in women were of the inguinal type.

Hilgenreiner's table shows more than 87 per cent. of the total number of free herniæ to have occurred in the second, third, and fourth decade of life.

The operation employed in nearly all of the cases of free hernia was the Wölfler method, which, he states, is practically the same as Bassini's method, the only difference being, that the cord is not transplanted and that in cases in which the internal oblique seems barely developed, the rectus muscle is made use of to strengthen the anterior wall of the inguinal canal.

With reference to wound healing, Hilgenreiner states that the percentage of cases that did not heal by primary union fell from 67.9 in 1895 to 1.4, and 0.8 per cent. in the years 1900 and 1901. In the 1000 operations since then performed, the percentage has risen to 4.2, which he ascribes to the fact that the operations were frequently performed by young men with insufficient training in asepsis. In the 1268 patients operated upon for free hernia within the fifteen years stated, 1460 operations, 8 deaths occurred, being a mortality of 0.63 per cent.

Regarding late results, he refers to his former statistics, stating that the frequency of recurrences therein given at 8 per cent., is too high, and that 5 per cent., would be more nearly correct.

In the incarcerated herniæ the small intestine formed the contents of the sac in 85 per cent. of the cases; in 59 per cent. alone, in 24 per cent. together with omentum. The omentum was found in 35.6 per cent. usually together with the small intestine; alone, only in 9.6 per cent. The large intestine was found in but 7 per cent.

Hilgenreiner points out the dangers of forced taxis, not less than 14 cases having come to the Clinic for operation after reduction *en bloc* of the incarcerated hernia, and in 6 cases after reduction of the gangrenous contents.

The *mortality* of operations for incarcerated hernia is shown as follows: In 116 cases, taxis was employed without mortality; in 496 cases, herniotomy was employed, with 10.9 per cent. mortality; in 20 cases, transposition of the gut was employed, with 40 per cent. mortality; in 110 cases, primary resection of the gut, with 55 per cent. mortality; in 26 cases in which an artificial anus was established, or secondary resection, with 88 per cent. mortality.

This gives an average mortality of 19.4 per cent. for the entire series of 778 incarcerated herniæ.

Grouping together the cases treated by taxis and simple herniotomy as non-gangrenous cases, on the one hand, and the suspicious and actually gangrenous cases on the other, a mortality of 8.8 per cent. for the former, and 58.4 per cent. for the latter will result. In 230 cases operated upon within the first twenty-four hours, mortality was 6.5 per cent.; in 107 cases operated upon within the first twenty-four to forty-eight hours, mortality was 15.8 per cent.; in 69 cases operated upon within the first forty-nine to seventy-two hours, mortality was 25 per cent.; in 45 cases operated upon within the first four days, mortality was 41.5 per cent.;

in 21 cases operated upon within the first five to six days, mortality was 52.2 per cent.; in 11 cases operated upon within the first seven to eight days, mortality was 68.5 per cent.; in 4 cases operated upon within the first nine to ten days, mortality was 63.6 per cent.; in 6 cases operated upon over ten days, mortality was 50 per cent. In three-fourths of all the fatal cases, death was due to peritonitis, the incarceration as such, and pneumonia.

Gangrenous Hernia. K. Berkofsky¹ relates the experiences at the City Hospital, Berlin (Dr. A. Neumann, Director), in connection with the operative treatment of the incarcerated gangrenous gut. The material on which he bases his observations covers a period of nearly seven years, *i. e.*, from November 1, 1902, to June, 1909.

Of 61 cases of gangrenous hernia, 43 were crural (4 male, 39 female); 10 inguinal (7 male, 3 female); 5 umbilical; 1 ventral; and 2 obturator hernia. By far the larger number of the crural herniæ occurred on the right, that of the inguinal, on the left side.

Practically all of these cases occurred between the fiftieth and eightieth years of life; none were below thirty; 2 between thirty and forty; and 2 over eighty years.

Berkofsky's table of cases shows that the prognosis does not depend solely upon the duration of the incarceration, but often upon other causes, such as the tightness of the constricting ring, weakness of heart, and previously undertaken attempts at taxis.

Of the 61 cases of gangrenous hernia, 4 must be excluded, as they reached the hospital in a moribund condition.

The operation of choice was primary resection, 49 of the remaining 57 having been thus treated. The Murphy button was used in all but 2 cases, and the abdominal cavity closed primarily in every instance after completion of the resection, while the abdominal layers were kept opened by more or less extensive tamponade.

The mortality in the cases of primary resection as shown by Berkofsky's tables was 32.6 per cent., that of the other operations employed, such as incision, tamponade, and transposition of the gut, 62.5 per cent.

Anterior Abdominal Hernia. Denk² reports 165 cases of anterior abdominal hernia observed at von Eiselsberg's clinic from April, 1901, to December, 1909, of which 135 were treated by operation. Of the latter, 89 were umbilical (6 men, 83 women), 39 epigastric and par-umbilical (35 men, 6 women), diastasis of recti 5 (3 men, 2 women), 2 lateral ventral herniæ (both in women).

Nineteen of these herniæ (14 per cent.) were incarcerated, *i. e.*, 18 umbilical and 1 epigastric hernia.

Of the 89 umbilical herniæ, 37 (41.6 per cent.) were entirely irreducible or but partly so. Of the 39 epigastric herniæ, 7 were accrete.

¹ Deut. Zeit. f. Chir., March, 1911.

² Arch. f. klin. Chir., Band xciii, Heft. 3.

In 22.5 per cent. of the cases, an injury was given as the cause of the herniæ. Denk believes, however, that a trauma acts merely as an exciting factor in the presence of anatomical predisposition or fatty degeneration of the fascia. In 21 cases of umbilical herniæ which were claimed to have developed as the result of a trauma, excessive adipose tissue of the abdominal wall was noted in 18.

As regards therapy, Denk states that a combination of the Condamin-Bruns and Karewski methods, with some slight modifications, is practised at v. Eiselsberg's Clinic. The technique is briefly as follows:

Oval circumcision of hernial tumor through skin and subcutaneous tissue down to fascia; preparation of sac, formation of pedicle; opening of sac at its basis; disposition of hernial contents; omphalectomy, removal of hernial ring in conjunction with sac and skin; suture of peritoneum, usually in transverse direction, catching in same posterior rectus sheath; elliptical splitting of anterior rectus sheath on both sides; suture of fascia flap thus formed; suture of lateral borders of wound of anterior rectus sheath; union of recti in the median line as far as possible; drainage by glass tubes.

As regards mortality, it is stated that of the entire 135 cases operated upon, 6 (4.4 per cent.) died as a result of the operation; that is, 4 of the 19 cases of incarcerated hernia, and 2 of the 116 cases of free hernia; which gives a mortality of 21 per cent. for the incarcerated, and of 1.7 per cent. for the free herniæ. In the 12 cases of incarcerated gut, resection of gangrenous small intestine had to be done twice; resection of the transverse colon once.

As regards wound healing, Denk states that, of the 129 cases that survived, the wound healed by primary union in 111.

Of 95 cases traced from one-half to eight and one-half years, 22 suffered a recurrence, and 73 were permanently cured.

Denk states that the influence of suppuration of the sutures is of great importance—suppuration of the ligatures having taken place in 43.7 per cent. of the relapses, while in the permanently cured cases, suppuration occurred only in 24.6 per cent.

In conclusion, Denk recommends:

1. Early operation, as the danger of recurrence increases with the size of the hernia.
2. Radical operation (muscle or fascioplasty, or both) is to be employed in every instance, except there be vital contraindications.
3. Every effort to obtain primary union should be made; stitch-hole suppuration to be avoided by the extensive use of catgut ligatures.

Incarceration of Loops of Intestine. Mintz¹ states that of 39 cases of retrograde incarceration of loops of intestine, described in the literature, the case of Pólya is unique in that only one incarcerated loop of intestine

¹ Deut. Zeit. f. Chir., June, 1911.

was found in the sac while the afferent loop had become gangrenous to the extent of 25 cm. In the sac were found the cecum, and 6 cm. of the lowest loop of ileum. Necrosis of the gut, and hemorrhagic infarction of the mesentery, according to Pólya, were due to the incarceration of the vasa ileocolica within the ring.

The second case of this kind is reported by Mintz, as follows: Male, aged fifty-five years; incarceration of three days' duration of a hernia that had existed since earliest childhood. Examination showed abdomen sensitive, distended; measurement of scrotum 30 and 15; meteorism absent; vomiting had set in; operation. Sac contained greatly distended hypertrophied cecum filled with fecal matter, together with appendix and a portion of the ascending colon. Pronounced constriction in the ascending colon below the place of incarceration. Resection of cecum, ascending colon as well as the gangrenous loops; blind closure of ascending colon, suturing of ileum end into hernial wound; cauterization of stump. Patient died on the ninth day after operation, of peritonitis.

The incarceration in this case evidently set in when, after the torsion of the mesentery, the distended parts of intestine became out of proportion to the size of the hernial ring.

Rare Forms of Hernia. In the *Deutsche Zeitschrift für Chirurgie* (November, 1908) Paul Tschmarke has an article containing a number of interesting cases of rare forms of hernia.

He states that he performed 50 radical operations for hernia within the last few years (26 for free, and 24 for incarcerated hernia) with a total of 5 deaths (10 per cent.). Four of the fatal cases were over seventy years of age. He then proceeds to give brief histories of the more important cases, as follows:

CASE I. ENCYSTED HERNIA. In 1902, a young farmer was sent to him for operation for a left hydrocele. The smooth tumor was not well-defined in its upper portion where a heavy cord was seen to continue through the inguinal canal into the abdominal cavity. Thickening or inflammation of the cord, a separately existing hydrocele of the spermatic cord, or an additional inguinal hernia were thought of. Operation showed a hydrocele within the tunica vaginalis. After removing the water, a second sac pressed down from above; this proved a true hernial sac, the lower pole of which had extended into the hydrocele. This sac contained matted-together omentum and small intestine. As the omentum outside of the sac was tightly adherent, forming a large lump, it was resected. The stump was buried and the sac and sheath of tunica vaginalis cut off, and the hernial opening closed by sagittal suture. The patient made a good recovery and left the hospital in two weeks.

These herniæ, Tschmarke states, were first described as "encysted herniæ," by Sir Astley Cooper.

According to Selcker,¹ only 11 cases of encysted hernia were published up to 1908, which would make the above related cases the twelfth of this peculiar form of hernia.

CASE II.—Case II refers to a woman, aged fifty-seven years, with an incarcerated inguinal hernia, left side, the size of a hen's egg. Operation showed the sac to contain the ovary plus loop of intestine. As the ovary did not show any pathological changes, it was replaced. Patient made an uninterrupted recovery.

That an *ovary in conjunction with other contents* should form the contents of a hernia sac, Tschmarke believes to be a rare occurrence. He states that Puech was able to collect 86 ovarian herniæ, mostly congenital. Of 38 cases reported by Englisch, the ovary was found inflamed in 17, cystic in 5, carcinomatous in 1, and normal in 15 cases.

CASE III.—DOUBLE INGUINAL HERNIA OF ENORMOUS SIZE in a child, aged two years. The left hernia was larger than a man's fist and the ring easily admitted three fingers. The right hernia was somewhat smaller. The left side was operated upon first, according to Bassini, and the sac was found to contain a large portion of small intestine and ascending colon with a very long appendix. Half a year later operation on the right side was performed. Here, too, the contents of the sac consisted of loops of small intestine, cecum, and vermiform appendix.

Tschmarke is convinced that cecum and appendix more frequently form the contents of a hernia than is generally known.

Tuffier collected 53 CECAL HERNIÆ. MacAdam Eccles, in the St. Bartholomew's Hospital reports of 1896, published 29 cases. K. Ritter v. Hoffmann² reports a series of 250 radical operations performed at Albert's Clinic (Vienna) in 11 of which the VERMIFORM APPENDIX WAS FOUND IN THE SAC. A very unusual thing, however, is to find the ascending colon and processus vermiformis in the sac of a left hernia.

Tschmarke refers to 5 such cases reported by various authors.

Tschmarke further reports a case in which the gangrenous vermiform appendix formed the sole contents of the sac, in a crural hernia, in a woman, aged seventy-two years. The operation was successfully performed but, about a week later, the patient developed pneumonia to which she succumbed on the ninth day.

He then describes a case of reduction en bloc which shows how little force may be required to accomplish such reduction, and how grave the consequences may be.

The patient, a laborer of strong physique, aged forty-two years, was suffering from pronounced peritonitis and ileus when he came under Dr. Tschmarke's care. No stool for four days; fecal vomiting. Abdo-

¹ Beit. z. klin. Chir., 1908, Band xxii, Heft 1.

² Deut. Zeit. f. Chir., Band xlv, p. 8.

men enormously distended and particularly sensitive in its upper left portion. All hernial rings were patent. The patient stated that he had had a right inguinal hernia since fourteen years, which at that time had been treated with alcohol injections. Two weeks ago he had received a new truss, and since then the trouble had begun although the hernia had not come down since.

As no tumor could be detected in the right inguinal region, Tschmarke opened the abdomen somewhat to the left of the median line where the patient complained of the most pain. Serosanguinolent fluid was evacuated, and enormously distended loops of small intestine crowded into the wound; colon collapsed; no volvulus or other mechanical obstruction could be found, but a tumor the size of a small apple was palpated in the lower left portion of the abdomen immediately above the cecum, which tumor could not be pulled into the wound. Tschmarke soon saw that he had to deal with a reduction en masse in an incarcerated hernia. On opening the sac, a loop of small intestine presented, which, showing no signs of gangrene anywhere, was replaced. Under increasing weakness of heart, and great abdominal pain, patient died two days after operation.

Tschmarke points out how little force may suffice to bring about a reduction en masse which, in this case, he believes was due to the new truss, although it is not clear how the strangulation later occurred.

CASE IV.—INCARCERATED OBTURATOR HERNIA. The patient, a woman, aged sixty-four years, claims to have been suffering from a double crural hernia for many years. Since eight days, pain in abdomen. No stool for four days; family physician reduced hernia a few days ago; condition grew worse; vomiting. Examination showed patient poorly nourished with enormously distended abdomen, and a double plural hernia the size of a walnut. The right can be easily reduced, not so the left, which is very sensitive. Incarcerated left crural hernia, possibly, pseudoreduction, assumed. Operation revealed an obturator hernia (enterocele). The patient made a splendid recovery and left the hospital four weeks after operation.

Graser (*Text-book of Surgery*) was able to collect 200 cases of this form of hernia, which, he states, is usually seen in old women, Berger's statistic showing 118 women and but 18 men. The mortality of incarcerated obturator hernia, up to 1892, was very great. Of 118 cases collected by Roser, 93 died with and without operation; 12 were cured by taxis, 10 by operation, 3 of the latter with fecal fistula.

Tschmarke has collected additional 10 cases with 4 deaths, showing the mortality to have improved somewhat.

Diaphragmatic Hernia. A very unusual case of INTERCOSTAL DIAPHRAGMATIC HERNIA has been recently reported by Dr. John C. A. Gerster,¹ of New York. It was evidently of traumatic origin, the

¹ *Annals of Surgery*, October, 1911.

patient having been hit on the left side of his chest by the end of a one-inch plank, some three years before. There was no hemoptysis nor disposition to vomit or other symptom. The swelling developed a few days after the accident, remaining nearly stationary in size.

Gerster was able to add 4 cases to the 9 collected by Alquier in 1905 to 1906, making a total of 13 cases.

The hernial opening in these cases may be as large as the tip of a finger or large enough to admit the entire hand. The herniæ vary from the size of a pea to that of an ostrich egg, a sac is usually absent.

Gerster believes the treatment should be mechanical or operative. If operation is done, the procedure should be varied according to the conditions found in the individual case. In some cases, one is not able to make a layer suture of the diaphragm and intercostal muscles; in others, one has to approximate the ribs above and below, obliterating the space through which the hernia formerly protruded; in others still, a plastic closure may have to be resorted to.

Summing up, Gerster states: "Intercostal diaphragmatic herniæ (1) are usually of traumatic origin; (2) they occur mostly on the left side in the anterior portion of the intercostal spaces (sixth to tenth inclusive) a region lying between the lower margin of the lung and the free border of the rib from the midline to the midaxillary line; (3) their symptoms are those common to herniæ in general; (4) the *x*-rays is of great value in determining the relationship of the various parts of the alimentary canal to the herniæ; (5) the details of operative treatment vary with the finding in individual cases."

Arthur Keith,¹ of London, believes that the passage of viscera from the abdomen to the thorax through a defect in the diaphragm, is not an uncommon form of hernia. He refers to J. W. Ballantyne² who found 100 cases published between 1888 and 1900; Mr. Lawford Knaggs³ who published 63 cases; and G. Paillard⁴ who gave references to 481 cases reported in the literature.

Keith's own remarks are based on a study of 34 museum specimens in London, 26 of which were congenital and 8 acquired herniæ. The congenital herniæ, he states, are chiefly those which occur at the unclosed pleuroperitoneal passages, of which there were 21; the other 5 being formed by developmental extrusion of the abdominal viscera, principally liver, through the septum transversum. In a certain proportion of the congenital cases he believes it possible to adopt surgical measures for the cure of the condition.

Fig. 7 shows the sites of diaphragmatic hernia as deduced from his

¹ British Medical Journal, October 29, 1910.

² Manual of Anatomical Pathology, 1904.

³ Lancet, 1904, p. 358.

⁴ Les variétés anatomiques de la hernie diaphragmatique.

34 observations. The upper thoracic aspect of the diaphragm is represented.

Leslie Rawes¹ reports a case of *congenital diaphragmatic hernia*, associated with embryonic organs, in a newborn infant who died on the second day of life. Fig. 8 shows the actual size of heart and left lung as found on autopsy.

A case of *diaphragmatic hernia in an adult* was published by Ernest Ringrose in the *British Medical Journal* of November 26, 1910.

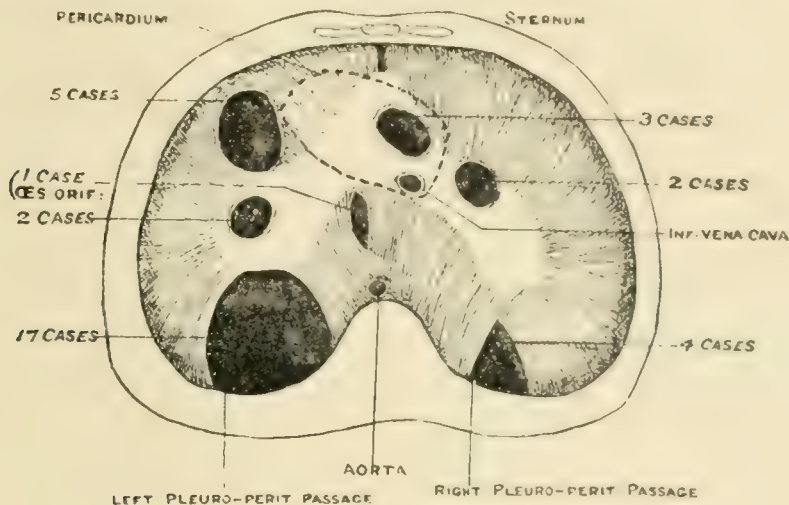


FIG. 7

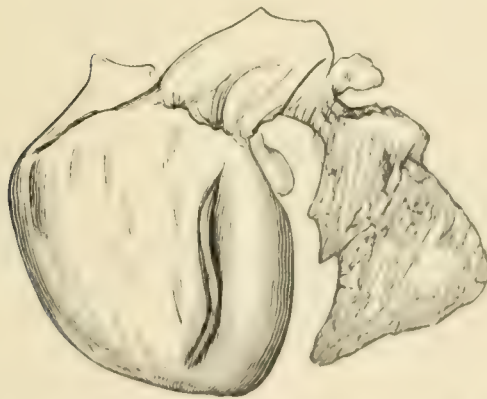


FIG. 8.—Actual size of heart and left lung.

The instances of patients with congenital diaphragmatic hernia living to adult life, are exceedingly rare. Ringrose's case was a woman, aged twenty-six years; married three years; no children, but pregnant. She died two days after the child was prematurely born without any labor pains or warning. On autopsy the condition as shown by the accompanying diagram, was found. The fundus of the stomach was situated within the thorax and there was an hour-glass constriction where part of the stomach passed through the diaphragm. After the hernia was reduced by pulling back the fundus and intestines into the Gersu, the hernia was reduced, being highly suggestive that

this migration into the thorax had been of considerable standing. In most cases of this type the hernia takes place accidentally, but in this case the author believes it to have been due to the gradual distention and pressure by the pregnant uterus; there was no strain nor violence; the hernia had evidently occurred two days before the child was born and the absence of labor pains negatives labor as the cause.

In an article entitled "INGUINAL-SUPERFICIAL HERNIA AND MALPOSITION OF THE VAGINAL PROCESS," K. Budinger,¹ of Vienna, calls attention to the frequency of malposition of the vaginal process. He states that, if the vaginal process in its descent takes a false direction, this may result in the abnormal position of a hernia, or hernial sac, a hydrocele, or hydrocele sac. All these anomalies together are merely sub-types of malposition of the vaginal process which are thought to be rare, particularly the type known as "intraparietal hernia."

In contrast to this, there is one form of malposition of the vaginal process which Budinger believes to be of comparatively frequent occurrence, namely, the one in which the vaginal process takes an abnormal direction *after* properly traversing the inguinal canal—an anomaly which, in the presence of a hernia, is called "inguinosuperficial hernia."

He refers to the great confusion prevalent as regards the nomenclature, and suggests the following:

1. Inguino-inguinal dystopia; meaning, that the vaginal process after leaving the external oblique, has travelled outwardly toward the anterior superior spine. Of this variety he has observed 16 cases.

2. Inguino-prevesical dystopia, where the vaginal process, after leaving the external inguinal ring, has passed transversely toward the median line. He has had one such case.

3. Inguinofemoral dystopia, in which the vaginal process after leaving the external inguinal ring, had descended along the inner side of the thigh laterally to the scrotofemoral fold. He has observed 2 cases of this kind.

4. Inguino-perineal dystopia, in which the vaginal process after leaving the external ring, has passed on toward the perineum (1 case).

Inguino-inguinal dystopia far exceeds the other inguinal dystopias in frequency, having been observed 16 times in a series of 20 cases.

Relatively speaking, the dystopic vaginal process is more frequently subject to the various disturbances of typical development, than the normal process. To be mentioned in this connection are (1) shorter length of the entire vaginal process; (2) retention of that portion which accompanies the testicle; (3) latency of the entire process (dystopic "hernial sac"); (4) patency of shorter sections, proximal and distal, the distal, or a middle portion (dystopic sac of a hydrocele).

The accompanying rough sketches (Fig. 9, 1 to 20) show the various points in question.

¹ Arch. f. klin. Chir., May, 1911, Band xcv, Heft. 1.

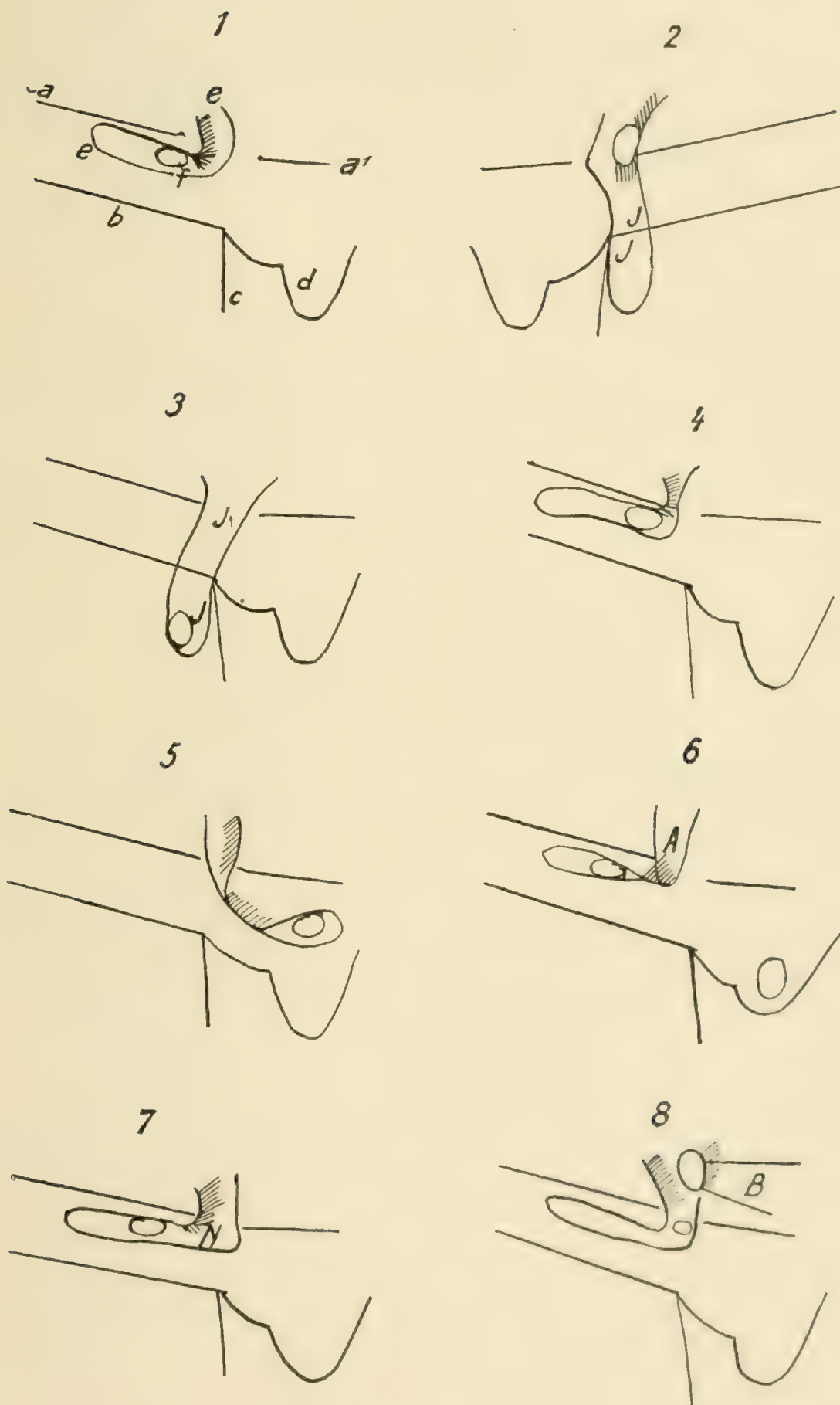


FIG. 9.—1 to 8

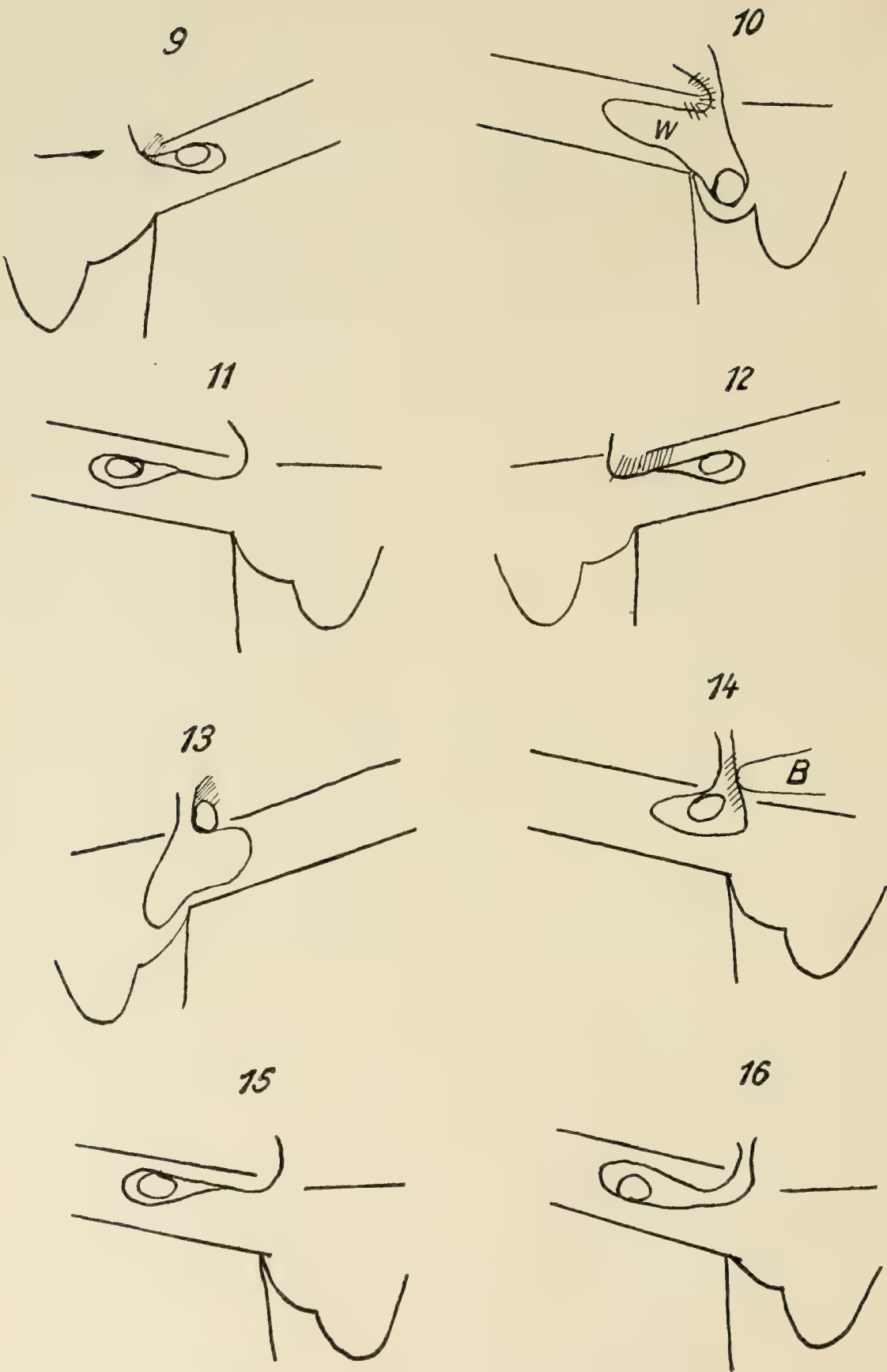


FIG. 9.—9 to 16

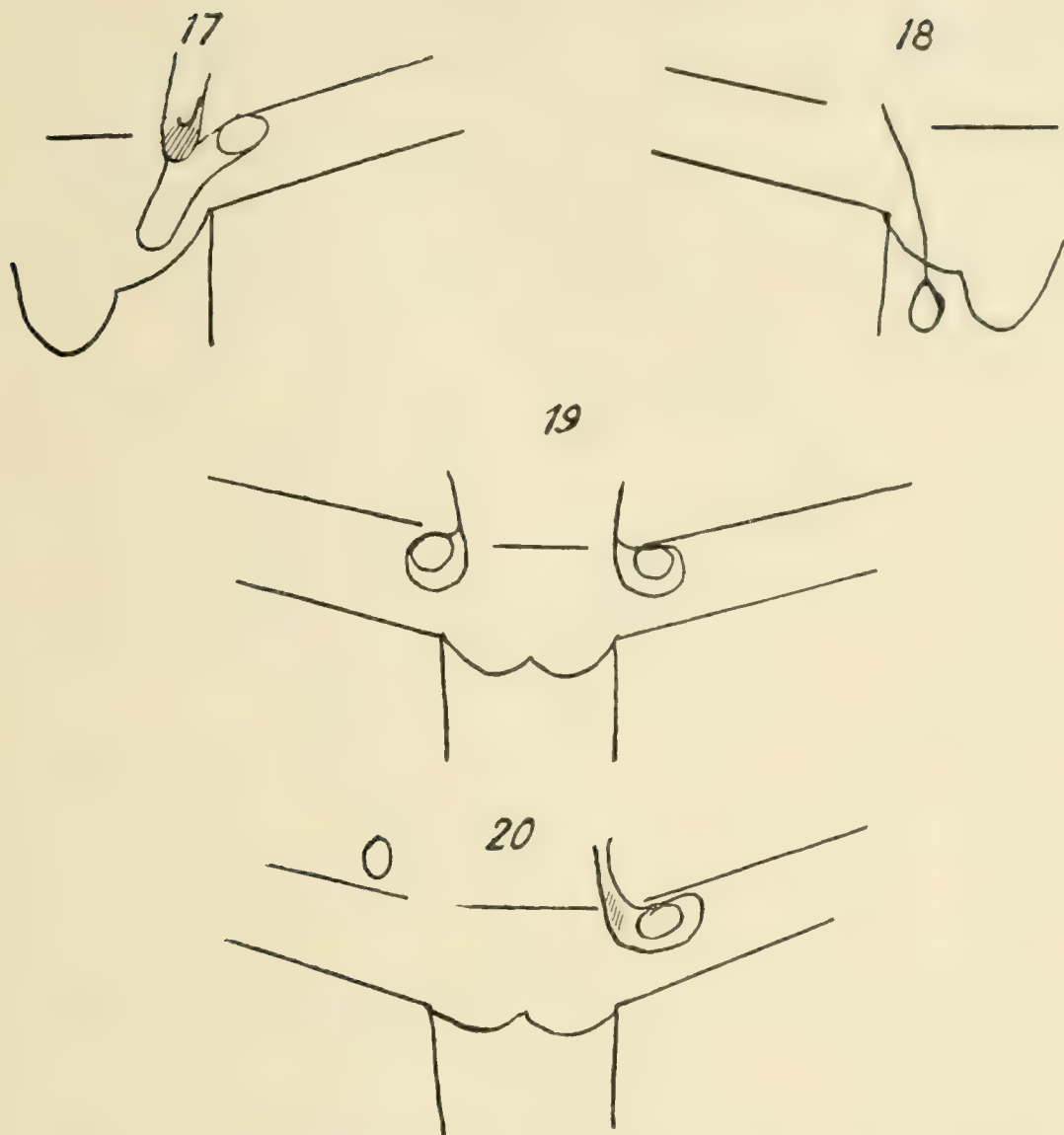


FIG. 9, 17 to 20.—*a*, aponeurosis of the external oblique; *b*, skin plus superficial fascia; *c*, median border of thigh; *d*, normally developed half of scrotum with testicle; *e*, vaginal process plus coverings; *f*, testicle; *J*, intestines in hernial sac; *N*, omentum in hernial sac; *A*, crowding forward of intestines, on external examination; *B*, bladder; *W*, hydrocele fluid. Shadings indicate cicatrices and adhesions.

It is significant to note that in not a single case was the correct diagnosis made before hand. This should be especially emphasized as regards the cases of inguino-inguinal dystopia of testicle, which had invariably been considered as ordinary cases of testicle retention.

Budinger states that in the literature, inguinal dystopic hernial sacs are invariably classed under the respective type of hernia. Thus, he found about 50 cases of "inguino-superficial hernia" reported, some of which, he states, were no herniæ at all, but merely cases in which dystopic sacs were accidentally discovered on operation or autopsy. He points out that an empty hernial sac is not a hernia, and believes that dystopic inguinal herniæ are rare, while dystopic inguinal hernial sacs are relatively frequent. He operated upon 2 cases of inguino-femoral

hernia (in addition to one case of dystopic bilateral, crural hernia) and upon 6 cases of inguino-inguinal hernial sacs without dystopic contents.

With regard to the causes of congenital dystopia of the vaginal process, Budinger states that, on basis of his material, he could suggest but two possibilities: (1) Primary disturbances in the descent of the vaginal process; (2) cicatrices after completed fetal peritonitis in the neighborhood of the vaginal process or in the latter itself.

In conclusion, Budinger remarks that dystopia of the testicle is frequently, though not necessarily, accompanied by retention. In the presence of retention of the testicle, the dystopic vaginal process may be nearly normal in length.

The position of the epididymis to the testicle is hardly ever normal in cases of retained and dystopic testicle.

Dystopic hydroceles are rare; dystopic, empty hydrocele and hernial sacs are relatively frequent. They may be monolocular entirely dystopic, monolocular partially dystopic, or bilocular.

Incarcerated Intersigmoid Hernia. In the *Deutsche Zeitschrift für Chirurgie*, June, 1911, Krall reports a case of incarcerated intersigmoid hernia observed at the Surgical Clinic in Heidelberg, which he believes to be the fourth case of its kind thus far known (first, Eve; second, Jomini; third, Coley).

The great rarity of this type of hernia, Krall believes due to the fact that the sigmoid flexure protects the recessus against the entrance of the small intestine. The flexure itself can enter the recessus only in the presence of an abnormally long mesosigmoid.

A brief history of Krall's case is as follows: Patient, a man, aged thirty-three years, entered the Clinic on November 18, 1910, with a history of having had an attack of severe abdominal pain and vomiting, three years ago. These symptoms are supposed to have lasted for eight days, at the end of which time, copious, thin, black stools were evacuated; since then the patient has been perfectly well up to four days ago when severe abdominal pains set in, followed by vomiting and meteorism. Diagnosis: Ileus; obstruction probably below the cecum. Operation showed the cecum greatly distended; no obstruction at either hepatic flexure or transverse colon. Incision upon lineal flexure also revealed no obstruction; descending colon was well filled. On trying to pull forward the sigmoid flexure, a resistance was at first felt which then suddenly gave way. At the apex of the flexure was seen the dividing line between filled and empty gut; no pronounced constricting ring. The flexure was twisted to the left about 180°; a large intersigmoid recessus almost the size of a hen's egg was palpated in which the apex of the flexure must have been caught and become incarcerated. No adhesions. In order to widen the recessus, the ring was stretched so that the anterior border tore in its middle; closure of wounds; layer suture; cure.

Fig. 10 would seem to give the only possible explanation of how the flexure could have entered the recessus. The rectum is turned 180° and is, therefore, covered by the mesorectum. This torsion alone furnishes an obstruction. As experiments on the cadaver have shown, only the lowest part of the sigmoid can enter the recessus.

Krall states that his is the only case on record in which the large intestine was found in the intersigmoid fossa.

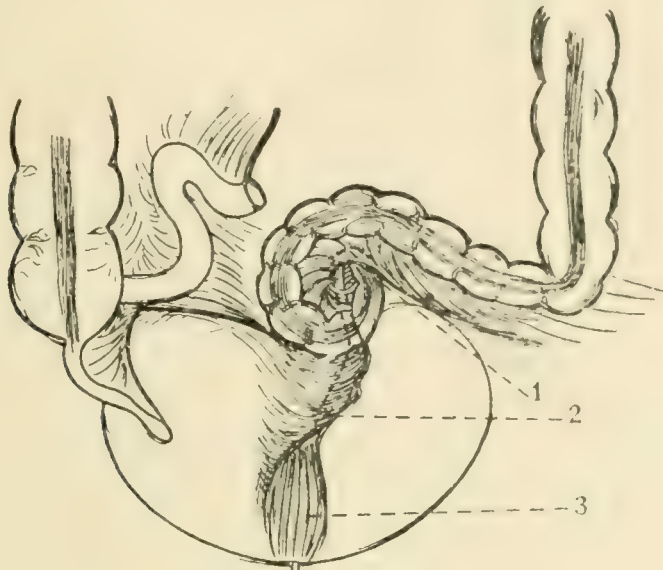


FIG. 10

Machol,¹ of the Bonn Surgical Clinic, reports a case of incarcerated intersigmoid hernia operated upon by him, in a man, aged sixty-six years, in very poor general condition. The symptoms which were said to have existed since six days only, consisted in constipation, severe abdominal pain, and vomiting, for which the patient was treated by his physician without avail. He was, therefore, sent to the clinic and, on the basis of the examination made, as well as the past history, the diagnosis of deep-seated ileus was made, probably deep-seated carcinoma, or volvulus of flexure. Despite the exceedingly poor general condition of the patient, laparotomy was decided upon as the only possible means of giving relief. On opening the peritoneum by a median incision 12 cm. long below the umbilicus, greatly distended and injected loops of small intestine with smooth serosa presented. In the region of the sigmoid, a soft tumor the size of a fist could be distinctly outlined. It was impossible to bring the flexure into the wound. On developing two loops of intestine that ran parallel over the flexure, a constriction ring was plainly visible in each. The constricted section quickly recovered and showed no signs of gangrene. It was found that the constriction had been caused by the loops of intestine passing through the entrance of the intersigmoid recessus, about the size of a silver dollar. It was

¹ Beitr. z. klin. Chir., 1911, Band lxxvi, Heft. 1.

amputated. In view of the poor condition of the patient, further inspection had to be desisted from, and the entrance of the recessus was closed with three button-hole sutures. Four hours after operation sudden collapse set in and the patient died under symptoms of heart failure. Autopsy showed, in addition to a beginning double pneumonia, signs of peritonitis.

Machol, after searching the literature, inclines to the belief that his case is the first that fully answers to all the requirements of a true intersigmoid hernia, and states that it is certainly clinically as well as anatomically, the best founded case of this rare variety of hernia.

"Hernia en W."—Lauenstein,¹ of Hamburg, reports two cases of "hernia en W."

The first refers to a man, aged forty-seven years, with a right inguinal (scrotal) hernia the size of a child's head, which had existed since five years, and another on the right side, of nine years' duration. The patient was admitted to the hospital on November 15, 1910, with all signs of incarceration. Operation performed seven hours after the onset of the symptoms. On opening the sac, two loops of small intestine presented, one lying over the other; the upper 45 cm., the lower 35 cm., and the connecting loop 40 cm. long; reposition well feasible; typical Bassini; primary union; uninterrupted recovery.

The second was a woman, aged forty-two years, who had been operated upon twice for a left labial hernia, the last time four months ago. Well until November 23, 1910, when she was suddenly taken sick with symptoms of incarceration. Operation, performed twelve hours later, showed two dark-colored loops of small intestine within the sac, one along side of the other; the upper loop was about 15 cm., the lower about 25 cm. long; between those loops appeared a mesenterial surface about 9 cm. high and 11 cm. broad. On trying to pull forward these loops there emerged from the left an almost completely black, apparently lifeless, gangrenous loop, about 50 cm. in length which was followed by an exudate of ill-smelling, bloody serum from the abdominal cavity. On pulling forward the connecting loop from the left above, it was seen that the whole was one large loop of small intestine having a common mesentery with the two loops found in the sac. It was further seen that the bases of these loops lay within a hernial opening separate from the one through which the 40 cm. long end-loop had just been pulled. The two were connected by a bridge of tissues two fingers in width, and running transversely to Poupart's ligament; resection of the total loop including four fingers of the afferent and two of the efferent loop; union of the two ends by Murphy's button; double ligation and division of the bridge between the two hernial openings; abdominal wound left open. Patient died on the following day in collapse.

¹ Deut. Zeit. f. Chir., May, 1911.

Autopsy showed the presence of a cecum pendulum which had been pulled over completely to the left side; Murphy's button was found 20 cm. distant from Bauhin's valve; 300 c.c. of partially coagulated, partially thin blood were found in the abdominal cavity; signs of beginning peritonitis; ascending colon was fixed; transverse colon, very long, had sunk down toward the symphysis. Volvulus was present in the upper part of the small intestine with torsion of 180°.

Lauenstein states that this is the fourth case reported in the literature in which, not only the mesentery has dropped into the hernial sac and then been doubly constricted within the ring but in which a hernial loop has first eventrated from the abdominal cavity through a double ring and then passed back again to the abdominal cavity.

The other three cases of this kind are those of Wistinghausen, de Beule and Lorenz. All died as promptly as the one just recorded, which would seem to show that this kind of incarceration of the mesentery is a very dangerous one.

Hernial Incarceration of the Adnexa. Langemak,¹ of Erfurt, publishes a case of hernial incarceration of the adnexa in an infant four months old. Examination showed inflammatory edema of right labium, and a tumor about the size of a pigeon's egg, which could be followed up into the extrenal ring. Diagnosis of incarcerated omental hernia or enterocele was made. Operation, September 4, 1910; the sac was found to contain a discolored and marked distended tube and an ovary which had undergone torsion to the extent of 360°; ligation and removal of the adnexa; closure of wound; primary union.

Langemak refers to Herrmann's statistic of 1899, comprising 70 cases of hernial incarceration in infants below two years of age, collected over a period of thirty years; in only 1 of which cases the adnexa were found in the sac.

Grunert, in 1903, published additional 4 cases collected from the literature, to which he added 1 personal observation. In 1910, Otto Fischer² reports another case which, together with Langemak's case just described, makes a total of 14 cases of hernial incarceration of the adnexa in the young, so far published.

Statistically, it is of interest that 13 of the cases were labial hernia, and only one a crural hernia.

Location: 7 right, 7 left.

Contents of sac: ovary and tube were found 9 times; ovary alone once; ovary, omentum, and loop of intestine once; ovary, tube, and loop of intestine once; both ovaries, and both tubes once; both ovaries, both tubes, and uterus once.

The adnexa were markedly inflamed, gangrenous, or cystic, 11 times, and had to be extirpated; in 3 instances they could be retained.

¹ Deut. Zeit. f. Chir., March, 1911.

² Archiv f. klin. Chir., Band xciii, Heft. 2.

With regard to mortality, only 2 deaths are recorded.

In an article on "ARTIFICIAL AND TRAUMATIC INGUINAL HERNIA," Krymow¹ points out that the former, which are produced by a special kind of "operators" are observed in Russia only, and exclusively in persons who wish to evade military duty, mainly Hebrews, for, he adds, the life of a Hebrew soldier is not an enviable one.

The question of artificial hernia has a threefold significance: (1) Social, national; (2) medicolegal; (3) scientific, inasmuch as a study of the methods employed for the artificial production of a hernia may, at the same time, solve the question of the etiology of inguinal hernia.

Krymow describes his experiments upon the cadaver for the production of artificial hernia, and states that he succeeded in producing the same by tearing the aponeurosis and the transverse fascia. This may be easy or difficult according to the size of the external ring and according to the strong or flabby condition of the fascia. A stout muscular layer may prevent the passage of a hernia, even though the fascia be torn. In the cadaver a long-continued pressure was sufficient to produce a hernia.

He reports 5 cases of his own, 3 of which were artificial and 2 traumatic, and on the basis of these, as well as other cases found in the literature, he divides traumatic inguinal hernia the same as the artificial, into two categories. To the former (the majority) belong such herniæ as are due to an injury above the external ring, in which the ring itself remains intact. To the second category belong such cases in which the injury involves and destroys the external ring. Artificial and traumatic herniæ that have developed after a rupture of the abdominal wall above the external ring cannot be differentiated. The physical as well as objective signs are the same.

Retrograde Incarceration. In view of the large number of cases of retrograde incarceration, reported in the literature, Klauber² takes occasion to give a resumé of the different findings and opinions of the various authors, and to state his own views regarding this form of hernia. He holds that the term "retrograde incarceration" applies only to such cases in which the phenomenæ of incarceration in the respective abdominal organ have been caused by a hernia, and not to those in which they are due to some intra-abdominal constricting factor. For the organs that end within the abdominal cavity, *i. e.*, appendix vermiformis with or without cecum, Meckel's diverticulum, tube, and omentum, the possibility of a retrograde incarceration is given when the same have come down in a hernia, but a peripheral part has returned into the abdominal cavity. For the gut which does not end within the abdominal cavity, the possibility

¹ Arch. f. klin., Chir., 1910, Band xci, Heft. 3.

² Volkmann's Collection of Clinical Essays, No. 574, July, 1910.

of retrograde incarceration is given when it passes the hernial opening twice as often (*i. e.*, four times) as under normal conditions.

The various possibilities for the development of pathological changes in the connecting loop are extensively discussed by the author.

It is worthy of note that of 50 cases involving the small intestine, 32 refer to right inguinal hernia, and 6 to a right crural hernia, showing a great preponderance in favor of the right side. It was further observed that gangrene of the connecting loop often set in very speedily, while the hernial loop in about half of the cases was normal or, at least, but very slightly changed.

As regards diagnosis, the symptoms of internal occlusion of the gut (ileus) come into consideration.

The prognosis in cases of early operation is favorable; of 19 patients in whom the gut was in good condition, 18 were cured; of 26 with gangrene of the gut, only 7 recovered, showing a mortality in these cases of 70 per cent.

Meckel's Diverticulum. Fritz Pabst¹ reports a case of true Meckel's diverticulum in an incarcerated intraparietal inguinal hernia successfully operated upon at the Bonn Clinic, in a boy, aged five years, who had had a right hernia for two years for which he had worn a truss. In October, 1909, while playing, he felt sudden pain in the right inguinal region which, on examination, presented a large, sausage-shaped tumor. Reduction was tried by the physician without avail; vomiting set in. Referred to the clinic where diagnosis of incarcerated intraparietal inguinal hernia, or reduction en bloc was made. Upon operation, a 7 cm.-long Meckel's diverticulum was found, from the end of which a thin cord extended into the abdominal cavity, being the remnant of the obliterated omphalomesenteric vessels; resection of diverticulum which was filled with soft feces. Patient made an uninterrupted recovery.

The question of the frequency of Meckel's diverticulum, Pabst believes of great interest. While Albers found but 1 diverticulum in 1000 dissections upon the cadaver, later investigators, *e. g.*, Mitchel, in 1898, found 39 in 1635; Turner found 81 in 10,360 autopsies; the English Anatomical Society, 90 in 4848. In a total of 21,693 autopsies, 285 diverticuli were found, being 1.31 per cent.

Pabst was able to collect from the literature 122 cases of Meckel's diverticulum in hernia, reported between 1672 and 1908, which, adding his own case, gives a total of 123 cases. Of these, 66 were inguinal herniæ; 24 were crural herniæ; 18 were umbilical herniæ; 7 were herniæ of umbilical cord; 1 hernia of the retrocecal recess; 86 of these were pure diverticulum herniæ, while the remainder contained, in addition to the diverticulum, omentum, small intestine, and even the appendix.

¹ Beitr. z. klin. Chir., 1910, Band lxi, Heft. 3.

Fifty-four of the cases were incarcerated, 35 being true diverticulum herniæ. Of the 66 inguinal herniæ, 35 were incarcerated, Meckel's diverticulum forming the only contents of the sac in 22 of the latter.

Of the crural herniæ, 17 were incarcerated, 7 of these being pure diverticulum herniæ. Of the umbilical, only 1 was incarcerated and this was not a pure diverticulum hernia. In 13 of the free umbilical herniæ, a diverticulum formed the only contents of the sac.

The majority of diverticulum herniæ occurred in the inguinal variety and on the right side.

As regards the sexes, as far as this point was stated in the histories, it appears that 57 of the cases were male (47 were inguinal, 7 crural, 3 umbilical) and 33 female cases (10 were inguinal, 17 crural and 6 umbilical).

While Hilgenreiner, in his statistics, computed the average age, in a series of 136 cases, at twenty-three and one-half years, Pabst found the the average age, in 90 cases in which it was stated, to be thirty years.

Pabst believes the prognosis of diverticulitis in hernia, or incarceration of a Meckel's diverticulum to be generally favorable. However, if the attack is acute and immediate operation impossible, the prognosis is exceedingly grave. That immediate operation offers the best chance is seen by the fact that of 60 operations done up to 1909, 47 recovered while of 21 cases observed within the same period of time in which no operation was performed, only 2 recovered. The mortality has been gradually improving within the last decade, only 1 death being reported in 28 operations done at the Bonn Clinic.

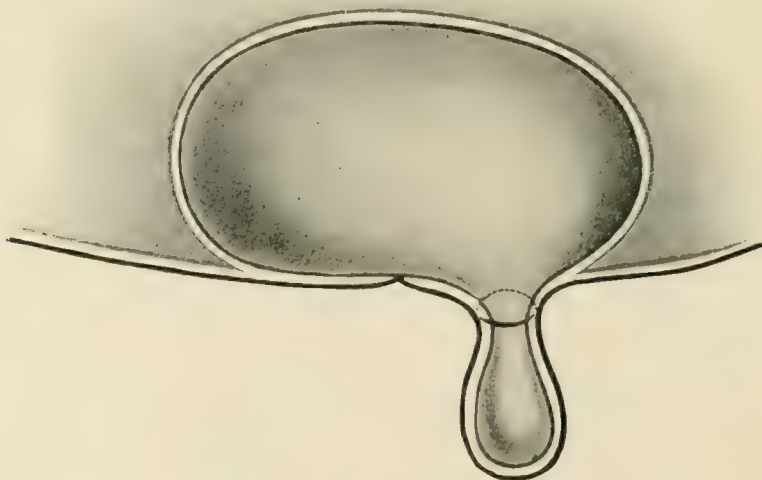


FIG. 11

Bladder Hernia. Felten¹ describes at length the various forms of bladder hernia.

¹ Arch. f. klin. Chir., 1910, Band xciv, Heft. 1.

1. He mentions especially the extraperitoneal bladder herniæ, *i. e.*, such in which the bladder has no peritoneal sac, and its wall on pushing

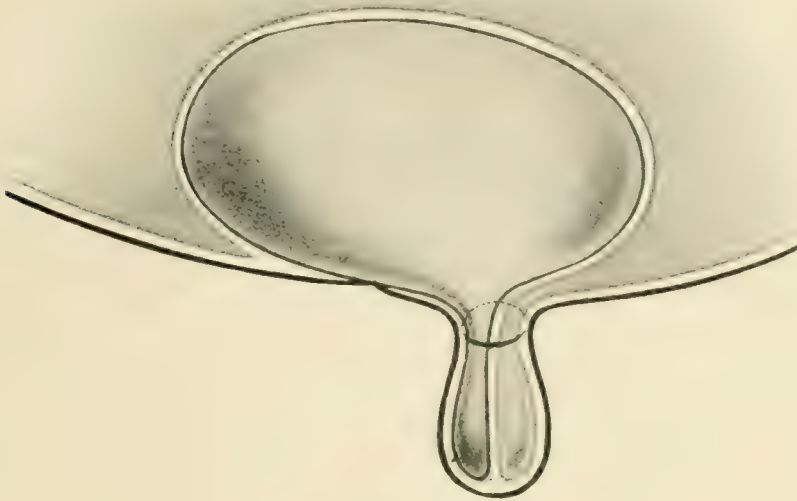


FIG. 12

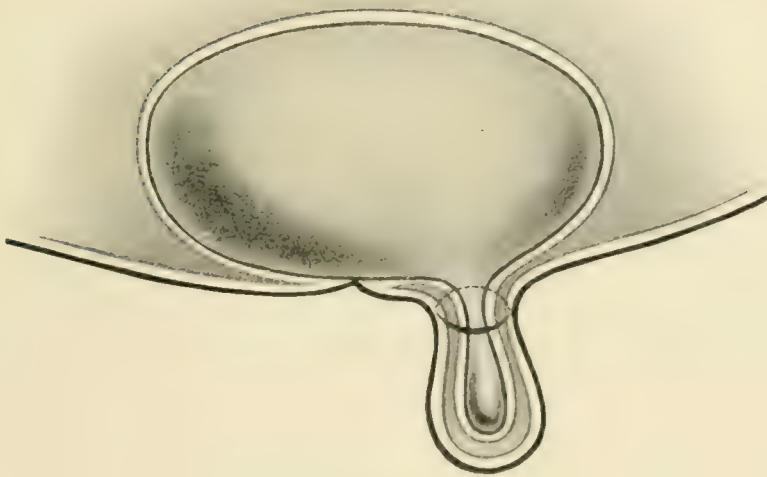


FIG. 13

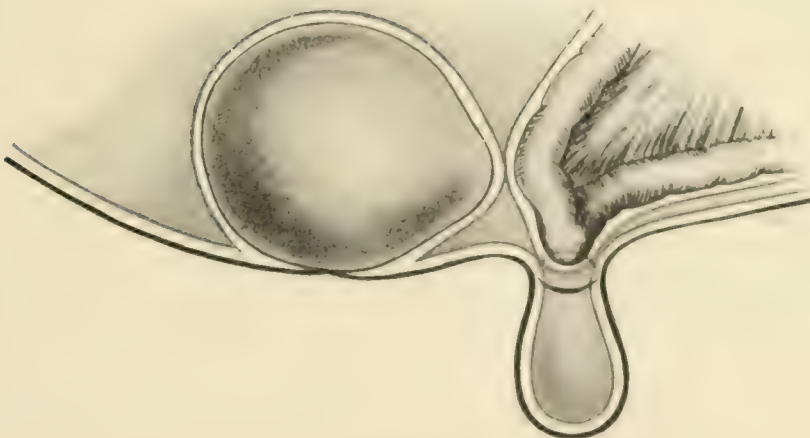


FIG. 14

forward through the hernial opening, presents a tumor without any surrounding peritoneum (Fig. 11).

2. Paraperitoneal bladder hernia, in which the bladder is found extraperitoneally, and a peritoneal sac has formed on one side (Fig. 12), into which other viscera may pass.

3. Intraperitoneal bladder hernia (true hernia), as shown in Fig. 13, in which the distended bladder cannot draw upon the parietal peritoneum for the enlargement of its covering, but the already-present peritoneal covering has to expand. When the bladder reaches the hernial opening, it is, itself, still partly covered by peritoneum while, on the other hand, it has to form a peritoneal sac in order to pass out of the abdominal cavity. Here, of course, conditions are favorable for the simultaneous eventration of other viscera; while, on the other hand, an intestinal loop adherent to the fundus of the bladder, on passing into a hernia, may easily pull the bladder along with it (Fig. 14).

Felten does not believe that bladder herniæ are ever congenital. As regards the frequency of this type of hernia in general, Grunner, in his statistics comprising 1841 hernial operations, found this complication in 0.9 per cent.; Eggenberger, in a series of 6778 operations, found it in 1.1 per cent., while Lotheissen, in 187 operations, saw a bladder hernia in 3.2 per cent.

Felten states that the youngest patient operated upon was eighteen months. The majority of male cases reported were between the fiftieth and sixtieth year of age; female between the thirtieth and fortieth year.

He describes one case of non-complicated extraperitoneal bladder hernia, which had come down through the lateral opening of an inguinal hernia. The patient was successfully operated upon, and dismissed fully cured, six weeks after operation. He further reports a case of incarcerated paraperitoneal bladder hernia, in which, however, the real hernial sac was found empty. An incarceration of the bladder had existed for some time. This patient, too, was cured. Felten reports a third case, an incarcerated lateral inguinal hernia with a loop of intestine as contents. Along with this was found in the hernial tumor extraperitoneally, a long-drawn bladder diverticulum, which had eventrated through the median opening of the inguinal hernia. Operation was performed, and the patient was cured of his diverticulum as well as the hernia.

Bilateral Inguinal Hernia of the Uterus. Makkas¹ reports a case of bilateral inguinal hernia of the uterus, operated upon at the University Clinic of Bonn. The patient was a woman, aged forty-seven years. She claims to have always been in normal health; no children. Since two to three years, has noticed swelling in the left inguinal region, which, up to two weeks ago, had always disappeared on lying down.

¹ Deut. Zeit. f. Chir., September, 1910

Examination shows in the left inguinal region, an irreducible, smooth tumor the size of a walnut. This can be easily pressed back into the canal, but it immediately reappears on releasing the finger. Diagnosis: Irreducible inguinal hernia with omentum as contents on left side; pedunculated, freely movable mass of omentum on right side. Operation reveals a uterus bipartitus, whose two halves have passed, one into the right, the other into the left inguinal hernia. Patient made a good recovery.

Makkas states that while unilateral inguinal herniæ of the uterus are comparatively rare, only 27 cases having been reported in the literature (16 of the non-gravid, and 11 of the gravid uterus), this case is probably unique.

As regards therapy, conservative treatment is usually indicated in the non-gravid cases. In the gravid cases, when the diagnosis can be made in time and reduction of the hernia is unsuccessful, artificial abortion is to be induced. In cases of full-term pregnancy, the Cesarean operation should be done.

Inguinoperitoneal Hernia. Cohn¹ reports a case of inguinoperitoneal hernia, which is remarkable for the fact that signs of incarceration set in with the first appearance of the hernia.

The patient, a young man, aged nineteen years, came to the hospital with a history of having been suddenly taken sick five days ago with abdominal pain and vomiting. Last stool four days ago; since three days, fecal vomiting. The patient positively denies ever having seen any signs of a hernia.

Examination showed the abdomen not greatly distended. At the border of the left rectus, two fingers width above the symphysis, a sensitive resistance about the size of an apple could be made out. The small finger easily entered the left inguinal ring; the inguinal canal was empty. No impulse on coughing. High up in the rectum an elastic resistance could be felt, which was sensitive to pressure. No abnormality as to size or locality of left scrotum. Operation; median incision from umbilicus to symphysis. On opening the peritoneum a smooth tumor the size of a child's head was seen to the left of the median line in the left inguinal region. It was covered by peritoneum. At its apex a cord of omentum of about two fingers' width, together with two loops of collapsed small intestine, entered the tumor. To the right, within the peritoneum, collapsed large intestine was found. Ligation and division of the omental band. By pulling at the stump of the omentum, a large piece of omentum plus an incarcerated loop of small intestine was developed from the "tumor." The incarcerated portion of small intestine was 6 cm. long, and was situated immediately below the ring of constriction. This inner hernial opening was about the size of a silver quarter.

¹ Deut. Zeit. f. Chir., November, 1910.

Within the "hernial ring" was found some clear, yellowish fluid. Resection of incarcerated portion of gut with end-to-end anastomoses. Resection of the peritoneal hernial sac above the internal inguinal ring; closure of wound. Patient made an uninterrupted recovery.

This case shows that in patients with large hernial rings, in the presence of signs of acute intestinal occlusion, the possibility of incarceration in the properitoneal portion of the sac of an inguino-properitoneal hernia, should be thought of even though the hernia is claimed never to have come down.



FIG. 15.—Femoral hernia of Fallopian tube without ovary.

Cohn refers to Breiter's statistics of 1895, covering 59 cases of inguino-properitoneal hernia, and states that Topuse, from 1895 to 1905, collected 16 further cases, to which he added 1 personal observation. Nearly all these patients presented symptoms of incarceration of an inguinal hernia, or were operated upon because these symptoms persisted in spite of reduction of the hernia. Nearly all the cases had suffered for many years and the herniæ had frequently come down, while, as stated, in his own case the patient was not even aware of the presence of the hernia.

STRANGULATION OF EPIGASTRIC HERNIA is a rare accident. Three cases have been reported by J. C. Ridgeway,¹ of the Royal Victoria

¹ British Medical Journal, December 17, 1910.

Hospital, Dover. Case I was that of a laborer, aged sixty years; Case II was a woman, aged fifty-eight years, and Case III, a laborer, aged sixty-six years. All 3 made good recoveries from operation.

A case of FEMORAL HERNIA OF THE FALLOPIAN TUBE without ovary has been reported by Parkes,¹ of Chicago. The patient, aged thirty-three years, was operated upon and made an uneventful recovery. Fig. 15 is reproduced from a cadaver prepared at the Chicago Polyclinic Laboratory, to show conditions found in the case.

Chronic Diarrhea Caused by Epigastric Hernia. Farrar Cobb² reports what he believes to be a new clinical fact, namely, that a chronic diarrhea can be caused by an epigastric hernia, and cites a case in support of this view. In this case the omentum was adherent to the sac, and the transverse colon was firmly adherent to the abdominal wall at the hernial opening. The diarrhea disappeared after the operation.

In view of the fact that the patient was of advanced age with marked arteriosclerosis and signs of nephritis, it does not seem entirely proved that the hernia was the sole cause of the diarrhea, although this may have been the case. I have observed a large number of cases of epigastric hernia, many of them with adhesions, but have never seen diarrhea as a result.

¹ Journal of the American Medical Association, August 20, 1910.

² Annals of Surgery, January, 1912.

SURGERY OF THE ABDOMEN, EXCLUSIVE OF HERNIA

By JOHN C. A. GERSTER, M.D.

Transverse Abdominal Incisions were discussed in *PROGRESSIVE MEDICINE* for June, 1908. Since that time they have met with marked favor in certain quarters abroad. Among gynecologists here, the so-called Pfannenstiel incision is frequently used, but, with this exception, American surgeons have not adopted the method to any extent. Abroad, Sprengel championed transverse abdominal incisions of all sorts at the German Surgical Congress of 1910. A year later, Bakes¹ published a series of 297 cases operated upon between April 16, 1910 and April 8, 1911. Of these, 188 healed by first intention, and 87 were drained. There were 22 deaths. Bakes stated that, so far, the results following these transverse incisions were good, irrespective of whether the rectus was retracted or cut through, and irrespective of whether, after such division, the cut ends of the muscle were united or left apart. Chief reliance was placed upon suture of the aponeurosis. Among other advantages claimed for this incision, it is said that the edges of the wound are more easily approximated, with less tension than is the case with longitudinal wounds. Such approximation is made still more easy by raising the head and shoulders a little. Further, when the patient strains, the edges of a transverse wound approach each other; while in a longitudinal wound this is not so. Lastly, it is claimed that a transverse wound heals more rapidly than a longitudinal one.

In Fig. 16, the various incisions are indicated. Among the most important are: (1) For exposure of the gall-bladder (here the rectus is retracted mesially); (2) a bilateral incision through which the stomach, duodenum, pancreas, and transverse colon may be reached; (4) is employed for more extensive exposure of the bile passages, etc., exceptionally, beside transverse division of the right rectus and of the linea alba with this incision, it may be necessary to open the left rectus sheath and pull that muscle still further toward the left; (6) is an incision to be used for exploration—for example, in cases of ileus; (7) permits attack upon cecum, ascending colon, hepatic flexure, and appendix (Bakes gave up the Lennander, or, as it is commonly known here, Kammerer incision, for this transverse incision); (8) affords adequate exposure of the pelvic organs.

¹ Arch. f. klin. Chir., Band xevii, Heft. 1, p. 205.

It was my personal experience to be present during a visit of Professor Pfannenstiel to one of our New York hospitals when a patient, showing the scar of a so-called Pfannenstiel incision, was presented for his inspection. The incision lay in the upper margin of the pubic hair. Pfannenstiel remarked that this was not his incision, but Küster's modification of it. The true Pfannenstiel incision was then stated by its author to lie almost at the level of the anterior superior spines having a slightly downward convexity. Subsequently, it was my good fortune to see Pfannenstiel use his incision in performing a laparotomy.

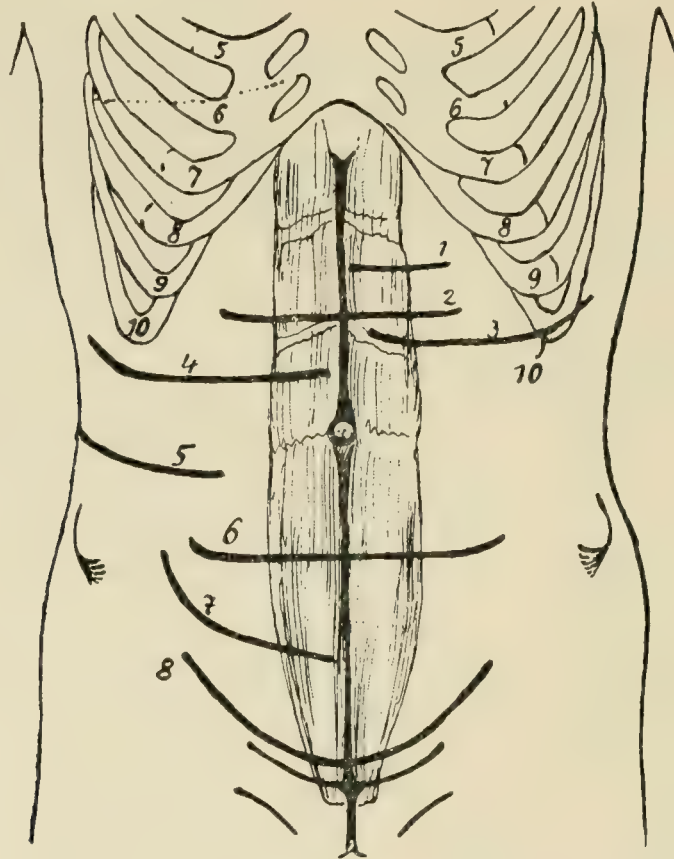


FIG. 16.—Transverse abdominal incisions. (Bakes.)

As regards the technique of all these transverse abdominal incisions described by Bakes, it is carried out as follows: The oblique and transverse muscles and their aponeuroses are split in the direction of their fibers; the nerves and vessels are thus avoided. In contrast to the care with which injury to the lateral muscular fibers is avoided, is the happy unconcern with which the rectus is divided whenever its mesial retraction does not provide sufficient room. It is noticeable, however, that both recti are not always divided, but that special mention is made of the fact that after division of one, an effort is made to retract, and not divide the other. The illustrations of Bakes' article show excellent cosmetic results in recent wounds.

As was said in the previous review of this subject by Foote, in 1908, the late results must be awaited before any final conclusions can be reached.

The Nerve Supply of the Anterior Abdominal Wall and its Surgical Importance is the title of an article by J. P. Hogue¹ who cites a number of instances in which hernia has developed to the mesial side of the scar after incisions over the lumbar and right iliac regions. This communication has been followed by a second article² reporting 8 cases of right inguinal hernia in which the hernia developed after a previous appendectomy. Both of these articles are referred to in the section on Hernia. However, in this connection, it may be well to remark that injury of the nerves in making a right rectus (Kammerer) incision may be avoided (after incising the anterior sheath of the rectus, freeing that muscle and retracting it mesially) by nicking the transversalis fascia transversely, inserting two loop-retractors through the opening thus made, and pulling them well apart (upward and downward). This retracts the nerve branches lying behind the rectus, also the deep epigastric vessels, which frequently are exposed in the lower angle of the wound, so that nothing but the peritoneum is now left in the line of incision. This procedure we have seen carried out many hundreds of times, and have never heard of an atrophy of muscle following its employment.

Plastic Uses to Which the Peritoneal Covering of the Gall-bladder May be Put have been recently suggested by Clairmont.³ In the course of a laparotomy for a tumor of the right hypochondriac region, an apparently isolated nodule of the liver was found. No other primary focus could be demonstrated to which this liver tumor might be secondary. It was therefore decided to resect the part of the right lobe of the liver involved by the mass. Preliminary to resection, it was found necessary to remove the gall-bladder in order to obtain proper access to the affected portion of the liver. The gall-bladder was readily shelled out subperitoneally, and removed. A second tumor mass was now made out, and, a multiplicity of tumors being established, further radical procedure was abandoned. A tear was accidentally made in the surface of the liver close to where the gall-bladder had lain. Through this opening blood and masses of tumor tissue began to escape. The preserved peritoneal coat of the gall-bladder was used to close this defect. Fine catgut sutures united the edge of the peritoneal flap to the surface of the liver. The raw surface of the flap lay in contact with the liver, while its serous surface looked toward the free peritoneal cavity. The leak was thus satisfactorily stopped. The abdomen was closed without drainage. Examination of the tumor tissue obtained at the operation proved it to be a spindle-celled carcinoma. The postoperative course was smooth. One month later the patient reported himself relatively well.

¹ *Annals of Surgery*, August, 1911, p. 153.

² Hogue, *Annals of Surgery*, November, 1911, p. 673.

³ *Zentralblatt. f. Chir.*, 1911, p. 1425.

In short, here was an instance in which the peritoneal coat of the gall-bladder was successfully employed to close a defect in the surface of the liver. Clairmont believes that, under certain circumstances, this readily available flap might be used to strengthen suture lines in suture of the liver, closure of the duodenal stump (Billroth II), gastro-duodenal union (Billroth I), suture of the transverse colon, or union of the bile passages with the gut. Naturally, conditions are not frequent where such a peritoneal plastic might be of use, but in rare, atypical cases, its employment may prove of great value.

The Effect of Trendelenburg's Position on the Heart is discussed by Trendelenburg¹ himself. He states that the hydrostatic pressure of the column of blood in the inferior vena cava may lead to acute dilatation of the right heart. The heart of a fourteen-year-old boy and that of a forty-five-year-old alcoholic were examined under the *x*-rays. In both, a broadening of the cardiac shadow (1 to 2 cm.) occurred after twenty-five minutes in Trendelenburg's position. The author therefore advised that his position with elevation of the pelvis be maintained not longer than ten minutes at a time, with adequate intervals between, in order to permit the heart to recover.

The X-rays as an Aid to the Diagnosis of Abdominal Conditions has continued to make great progress during the last year. For details of this, the reader is referred to the sections of this article dealing with various organs.

One point of general interest, may be mentioned here—radiologists practically agree² that by the end of the second, or beginning of the third month of pregnancy, the diagnosis by *x*-rays can be established with certainty. Given an unreliable history, the *x*-rays may decide the character of a doubtful tumor with nicety.

The *x*-ray cinematograph is being more and more widely used in the study of the alimentary tract.

A Curious Sequel to Gunshot Wound of the Abdomen is reported by Momm.³ The subject was a laborer, aged twenty-three years. The bullet passed through the liver into the lumen of the aorta, and was moved along to the left femoral artery where it gave rise to an aneurysm four weeks later. The patient ultimately died of sepsis. The case is of especial interest since it shows that a penetrating wound of the aorta is not necessarily fatal.

Meteorism after Abdominal Trauma. An instructive case is cited by Zesas.⁴ After a contusion of the abdomen from a football, there was temporary unconsciousness, followed by vomiting and severe

¹ Prakt. Ergeb. d. Gebhils. u. Gyn., 3, Jahrb. 1, abt.

² Edling, Fortschr. a. d. Geb. d. Röntgenstrahlen, Band xvii, Heft. 6, p. 345. R. v. Jaksch, Zentralbl. f. inn. Med., 1911, No. xiv.

³ Deut. med. Woch., 1910, No. 52.

⁴ Arch. Gén. d. Chir., vol. ii, 1911.

abdominal pain, together with marked meteorism. However, no rigidity or local tenderness was present. After a few hours, all symptoms subsided. Zesas remarks that such a rapidly developing meteorism after abdominal contusion, is solely due to reflex paralysis of the intestine, and is not a sign of severe visceral injury.

Operations for Relief of Ascites. For the relief of ascites a number of palliative operations have been devised. Among these the idea of employing a vein to carry off ascitic fluid is not new. Recently, Castle¹ has suggested a very simple method of insuring the patency of the vein's mouth at its union with the peritoneum. The saphenous vein is usually chosen as best adapted for the purpose. After dividing it sufficiently low in the leg and mobilizing it, Castle brings the free end of the vein into the peritoneal cavity, where it is split down about 1 cm. with fine scissors, so as to make three equal flaps. Each of these is fastened to the peritoneum by a single mattress suture of fine silk, introduced by a small, round, curved, French needle. The procedure is carried out on both sides. The results reported are inconclusive.

Morse² has published a case in which a similar bilateral venoperitoneal anastomosis was performed for chylous ascites. In this instance, the operation was followed by complete recovery. The patient was examined twenty-six months after operation and found perfectly well. Morse, nevertheless, most emphatically states: "I will . . . neither make an explanation as to the etiology of the condition, nor assume that the operative procedures . . . were the cause of the almost miraculous recovery from an apparently hopeless condition. However, the fact remains that the man entirely recovered."

Oily Substances in the Peritoneal Cavity have been supposed to prevent the formation of adhesions. The following abstract is of interest in this connection. In a careful review of the literature dealing with peritoneal adhesions, Richardson³ cites a case of Kelly's in which he had had the opportunity to observe the ultimate effect of both olive and vaseline oils in very extensive peritoneal adhesions. After the adhesions were released, he carefully applied sterile olive oil to all of the denuded surfaces before closing the abdomen. At a subsequent laparotomy for pernicious vomiting, about a year later, the adhesions were fully as widespread and dense as at the other operation. This time he substituted vaseline oil, which was applied with great care and thoroughness; but again, within a year, laparotomy became necessary, and there was no evidence whatever of benefit from the lubricant.

Here it might also be suitable to call attention to the vogue that *camphor oil as a preventive against peritonitis* has had in Germany, especially among certain gynecologists. To inject oil containing some

¹ Journal of the American Medical Association, vol. lvii, p. 2123.

² Boston Medical and Surgical Journal, February 22, 1912, p. 294.

³ Annals of Surgery, December, 1911, p. 758.

camphor previous to laparotomy, as a prophylactic measure against the occurrence of peritonitis, sounds like a *testimonium paupertatis*. Where the proper technique has been observed, nowadays no one expects an operation for a localized peritonitis to be followed by a spread of the infection.

Another Source of Infection deserves mention here. In many clinics it is evident that a great deal of time and care is often taken in *preparation* of the patient's and operator's skins and of the armamentarium, and great stress is often laid upon many superfluous and complicated details, while, relatively no notice is paid to gross "breaks" in asepsis during the draping of the patient and while the operation itself is going on. This disregard of care in *remaining clean*, is a common fault observed in many operating rooms not only abroad, but here as well. Perhaps if more attention were paid to this side of the subject, less would be written about permeability of rubber gloves, catgut infections, and the relative value of various methods for cleansing the skin.

Fibrolysin is a drug which, it has been claimed, has for its chief quality the power to lessen and to dissolve scar tissue. The articles reporting its successful use in practice do not clearly demonstrate that fibrolysin alone was responsible for the improvement following its administration. A good example of such literature is the communication of Bausenbach¹ who employed massage and heat, as well as fibrolysin injections, for painful adhesions in the region of an appendectomy scar, and then attributed the success of his treatment solely to the fibrolysin.

Sidorenko's² comprehensive and logical monograph includes a review of the literature on the subject as well as a report of his own experimental and clinical investigations. He concludes that the examination of histological specimens reveals no effect of fibrolysin; the lymphagogue effect of fibrolysin is not clearly proved as yet; on the basis of varying leukocyte counts, fibrolysin cannot be considered a specific agent for evoking leukocytosis; and, that the therapeutic dose is harmless and gives rise to no accompanying symptoms. In short, after a critical examination of the material of other authors, and because of his own clinical and experimental experience, Sidorenko believes the statement may be made, that fibrolysin is of no therapeutic value in affecting scar tissue.

Hormonal. During the past year an increasing number of articles have appeared reporting favorable results from the use of this drug, both in postoperative ileus and in chronic constipation. Mention of some of these has been made in *PROGRESSIVE MEDICINE* for June and December, 1911.

Recently, Dittler and Mohr,³ while not denying the peristaltic effects

¹ Med. Klin., 1910, p. 1941.

² Deut. Zeit. f. Chir., Band cx, p. 89.

³ Münch. med. Woch., 1911, No. 46, pp. 24 to 27.

claimed for hormonal, point out that certain dangers apparently accompany its injection. These authors refer to the experiments of Heidenhain and Popielski who found that a marked fall in blood pressure regularly follows not only injection of extracts from the mucous membrane of the stomach and gut, but also injections of extracts of pancreas, blood, and brain, and injections of Witte's peptone. The peristaltic effect of all these substances is invariably accompanied by other symptoms, the most constant of which is the aforementioned fall in blood pressure. Dittler and Mohr found that similar effects followed injections of hormonal (an extract of spleen).

A case is then cited by them, where hormonal was administered to a man, aged twenty-eight years, who was convalescent after a pneumonia which had been complicated by an acute hemorrhagic nephritis. On account of persistently troublesome meteorism, 14 c.c. of hormonal were given intravenously. One-half hour later, profound collapse came on (pulse barely perceptible, about 180); the patient responded to active stimulation and eventually recovered. The meteorism lessened.

More convincing, and hence of greater detail, is the report of Sabatowski¹ announcing the result of detailed animal experiments and careful clinical observations upon the effects of hormonal. From his experiments on animals, Sabatowski concludes that: (1) Intravenous injections of hormonal are followed by a marked, but transient, fall in blood pressure; (2) during this period of depression, there is a lack of coagulability of the blood, and, at times, marked salivation; (3) movements of the intestine are somewhat stimulated, but only to the degree by which intestinal peristalsis is increased by a lowered blood pressure; (4) neither after single nor repeated injections (both subcutaneous and intravenous), was an effect of long duration observed; (5) hormonal acts neither upon the gut wall nor upon Auerbach's ganglia; the effect is a central one, and is evoked by way of the blood; (6) all its pharmacological characteristics indicate that hormonal contains vasodilatin (Popielski), with which its action is identical. Vasodilatin is obtained from animal tissue by the same method employed in preparing hormonal.

Sabatowski tested hormonal clinically on eight cases. In these, forty-eight hours were allowed to elapse before considering the effect negative. The results of his experience showed that: (1) Large doses of hormonal, intravenously, caused sudden fall in blood pressure, loss of coagulability of the blood, and an insignificant increase in movements of the intestine—all these manifestations lasted a short while, after which there was a return to normal; (2) following intramuscular injection, the above symptoms were barely noticeable; (3) hormonal acts exactly like Popielski's vasodilatin; (4) Sabatowski warns against

¹ Wien. klin. Woch., 1912, p. 116.

the intravenous use of hormonal on human beings, especially after an anesthetic. For the reasons cited above, the preparation has no therapeutic use. The observations which have just been reviewed would seem to make superfluous any further argument about the value of hormonal.

The Biological Treatment of Peritonitis by Flooding the Abdomen with More or Less Concentrated Solutions of Sugar is the subject of a voluminous article by Franz Kuhn.¹ This work consists in a collection of others' experience, in which good, bad, and indifferent material is impartially gathered together. The authors are quoted extensively whose findings further his own theory. To controvert the various arguments put forth in this paper would be a waste of time and effort. The gist of the matter consists in strenuously advocating the treatment of peritonitis with sugar solutions which are supposed to inhibit bacterial activity. Perhaps this would be feasible if the concentration of sugar in the abdominal cavity could be indefinitely maintained at a maximum; but this introduced foreign material must surely drain away—if the patient lives long enough—and, it is well known that many pathogenic bacteria grow excellently on media containing 2 per cent. or less of sugar. So, in an abdominal cavity, these favorable conditions might be established in the course of time. The article is inconclusive in the light of Heyde's work (mentioned elsewhere). Only a few of the commoner aërobes were experimented with by Kuhn himself. It is significant that no series of cases is reported in which his procedure has been employed.

Klotz clearly points out the error of many of Kuhn's bacteriological deductions in a recent article in the *Münchener medizinische Wochenschrift*, 1911, No. 194, p. 2337.

Instruments. THE USE OF SPECULA IN THE ABDOMINAL CAVITY, has been reported by a number of authors.

Kelling,² in 1902, seems to antedate the others. Apparently, a cystoscope was used to explore the abdomen of two cases. Since then he has published nothing on the subject except a recent claim for priority.

Jacobaeus, in October, 1910,³ reported 19 cases in which he had used a cystoscope, introduced through a small incision, to explore the pleural and peritoneal cavities. Recently,⁴ a larger series of cases has been reported on. This procedure in the abdominal cavity he has termed "*laparoscopy*." Some eighty examinations were carried out upon 45 patients. The diagnosis was made in such conditions as cirrhosis of the liver, syphilis of the liver, tubercular peritonitis, abdominal carcinosis, etc.

Bernheim⁵ reported independently, in June, 1911, having explored

¹ Arch. f. klin. Chir., Band xvi, p. 759, Heft 3, p. 896, Heft 4.

² Münch. med. Woch., 1902, No. 1.

³ Ibid., No. 40.

⁴ Ibid., 1911, No. 38.

⁵ Annals of Surgery, June, 1910.

the abdomen with a speculum (an ordinary proctoscope of one-half inch bore, having a rounded edge). The instrument was used in two cases; one, a carcinoma of the head of the pancreas, the other a chronic appendicitis. In the latter, by use of the instrument, the presence of gastric ulcer was ruled out. Bernheim mentioned the idea of applying the same principle to exploration of the pleural cavity.

Nyström¹ also, has used a proctoscope for this purpose, and substituted a glass hemisphere for the usual metal obturator. He concedes that the omentum may obscure the view, and that there are many cases in which the inspection afforded by this instrument is inadequate. Nyström tells of a small traumatic rupture of the bladder which was seen with the speculum after it had been felt by the examining finger.

The use of specula in the abdominal cavity necessarily has marked limitations. So much can be learned by touch, that the use of an instrument where the "feel" of intra-abdominal tissues is practically lost, can never equal the advantages of a properly conducted exploratory laparotomy. However, in certain cases, a speculum may furnish enough information to make further exploration unnecessary, but, in many more, it will probably assume the role of a scientific plaything.

Kuhn² has "for years" used various vaginal specula in exploring acute inflammations of the abdomen. His technique—of introducing specula through openings made over supposedly uninfected parts of the belly in order to inspect, among other things, the exterior of an intra-peritoneal abscess wall—is hardly to be taken seriously.

An excellent **FORCEPS FOR INCREASING SPEED IN SUTURING** was presented by Wyllys Andrews³ at the meeting of the American Medical Association, in June, 1911. The illustrations, Figs. 17 and 18, explain its action.

According to Andrews, the instrument is especially useful in:

"1. Deep "suture ligatures," single or multiple, around vascular pedicles, such as the mesentery, meso-appendix, broad ligament, hernial sac, etc. In the depths of a wound or cavity, with the sewing forceps one does not have to see the needle point—the forceps automatically and infallibly grasps it and draws it through. It is a particularly rapid method of cross-suturing a wide pedicle of any sort.

"2. Straight lines of suture, in which accuracy of spacing, rather than accuracy of fitting, is desirable. Such wounds are abdominal incisions, both muscle splitting and in the middle line. These are rarely closed now by single rows of deep stitches, but almost universally by anatomical restoration of the concentric layers from within outward. The suturing machine does this with a speed and accuracy far greater than the hand or needle holder."

¹ Zentralbl. f. Chir., 1911, p. 1403.

² Ibid., p. 1177.

³ Journal of the American Medical Association, vol. lvii, No. 8, p. 602.

A SIMPLIFIED CLAMP FOR ENTERO-ANASTOMOSIS is described by Willard Bartlett,¹ as follows:

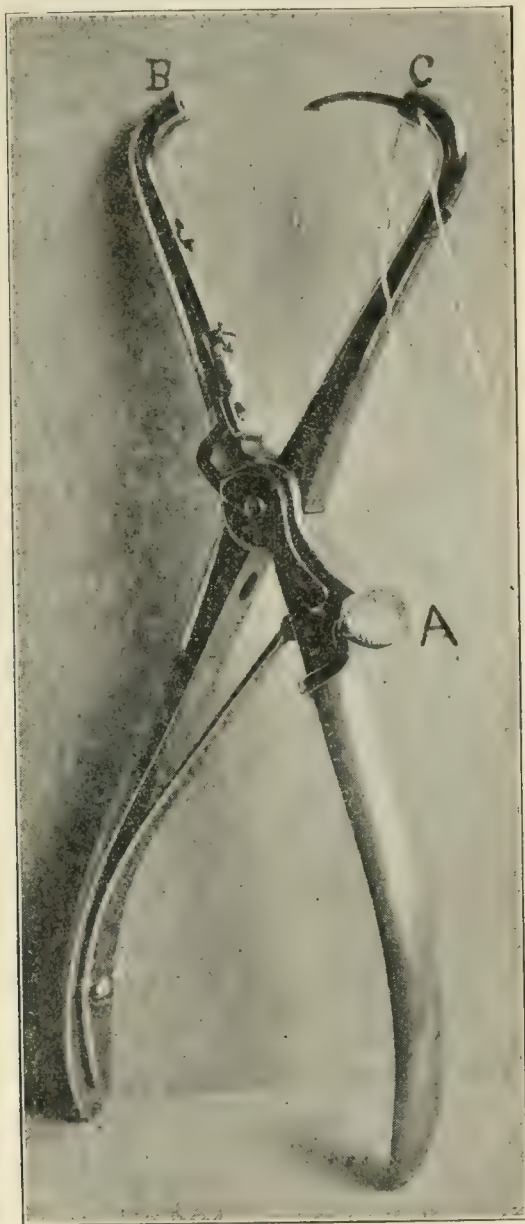


FIG. 17.—First position. Ready to insert stitch. On closing handle needle passes flaps and is seized automatically by opposite blade carrying thread through tissue. On pressing catch *A* needle is released at *B* and returns to *C*, ready for next stitch. (Andrews.)

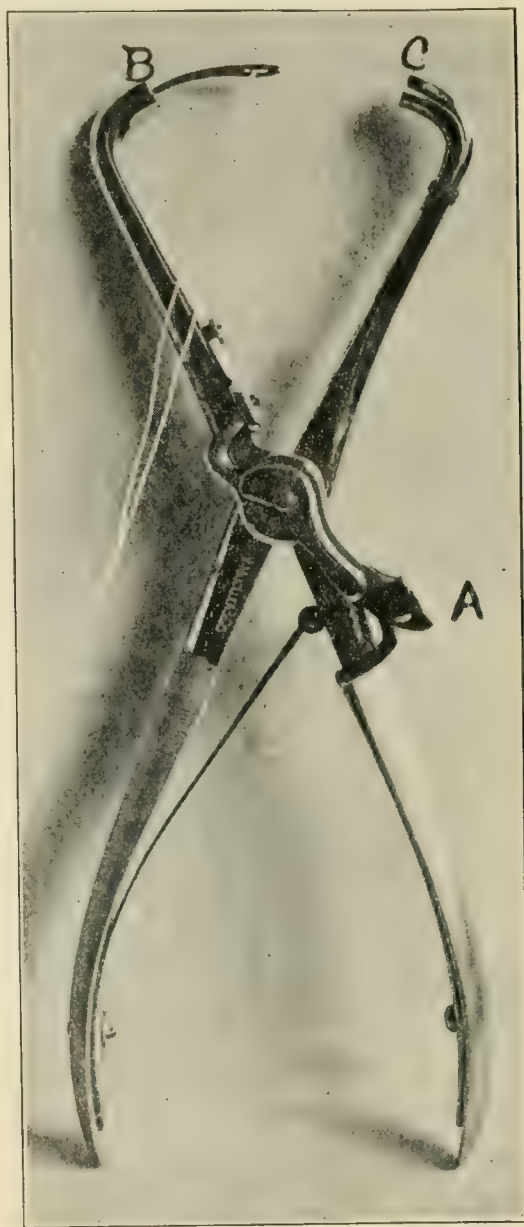


FIG. 18.—Second position. Needle seized automatically by its point at *B* and pulled through tissue by closing and opening handle. On pressing thumb catch *A* needle returns to first position, *C*. (Andrews.)

“As noted (Fig. 19), the contrivance is made up of three parallel bars *AA*, *BB*, and *CC*; *AA* being threaded to run on screws on either end, while *BB* and *CC* are free. The action of the thumb screws is to draw all three bars together. Rubber tubing can be drawn over

¹ *Annals of Surgery*, August, 1911, p. 174.

the three cross-bars by simply removing one of the screws." Bartlett employs this instrument as follows: "The cross-bars are set at a distance of 1 cm. from each other. Two catch-forceps draw the stomach up through one interspace, while the intestine is similarly engaged in the other. The desired position of the viscera having been thus secured, the bars *AA* and *CC* are pressed against them by the operator's thumb and fingers until, by this direct and accurate means, he has secured

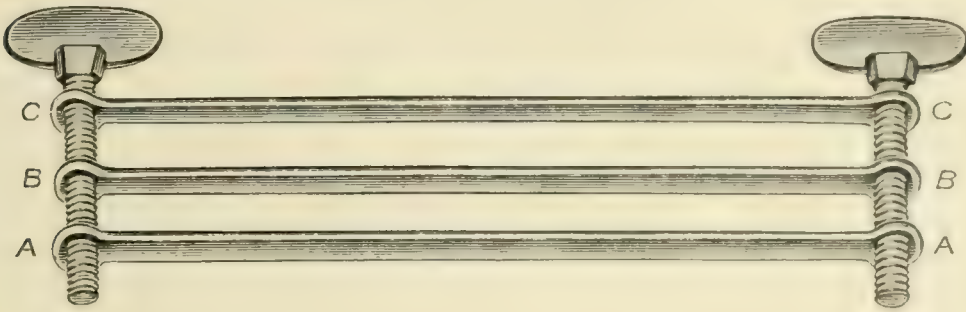


FIG. 19.—Clamp for entero-anastomosis. (Bartlett.)

exactly the pressure which is deemed necessary and safe. Then the whole is locked in position by turning the screws until they engage."

Bartlett has used the instrument without the middle bar, but does not consider it safe.

This instrument may be especially useful for an operator who is hampered by incompetent assistants, whose awkward and unexpected movements are less likely to disturb such a small, neat contrivance,

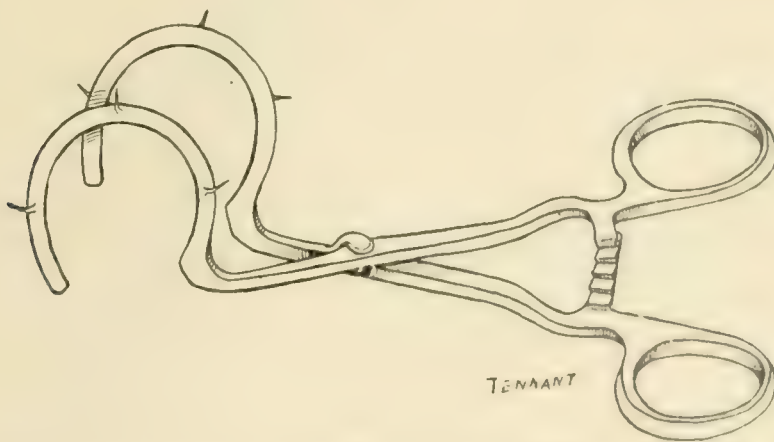


FIG. 20. —Tennant's clamp for holding the gut while end-to-end anastomosis is being performed.

than where any of the usual intestinal clamps, such as Doyen's, or Roosevelt's, are being employed.

Tennant¹ has devised a clamp (Fig. 20) designed to conveniently hold the two ends of gut, while an end-to-end suture, according to the Connell method, is being done. The suture is begun at the mesenteric

¹ Journal of the American Medical Association, vol. lvi, No. 20, p. 1445.

border and is immediately tied, both ends being left long; it is then carried up on each side until the ends meet, and are tied at the dome of

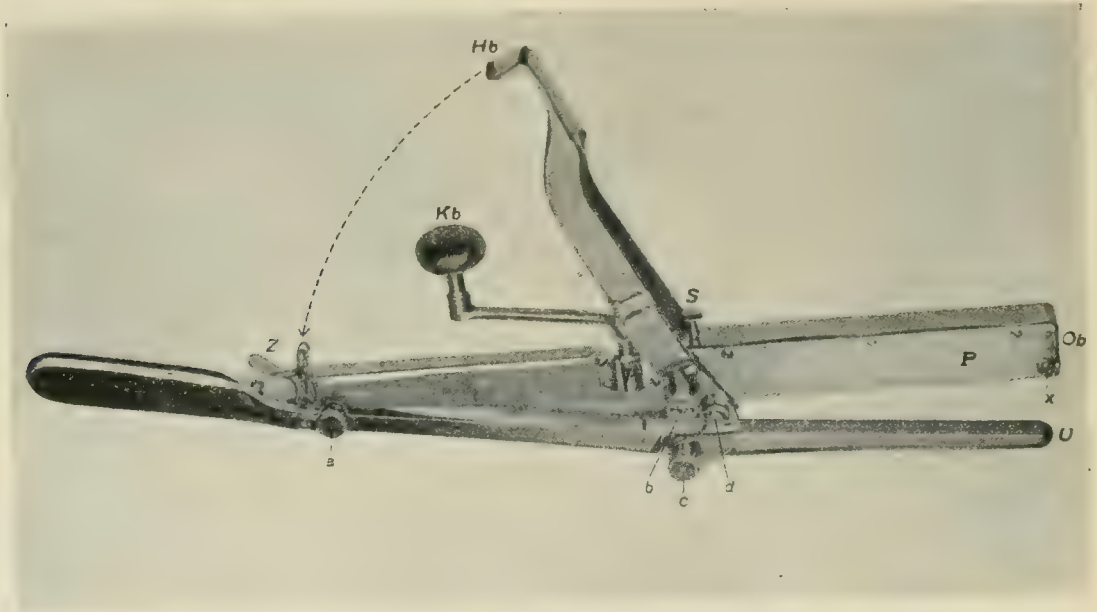


FIG. 21.—Hülth's instrument.

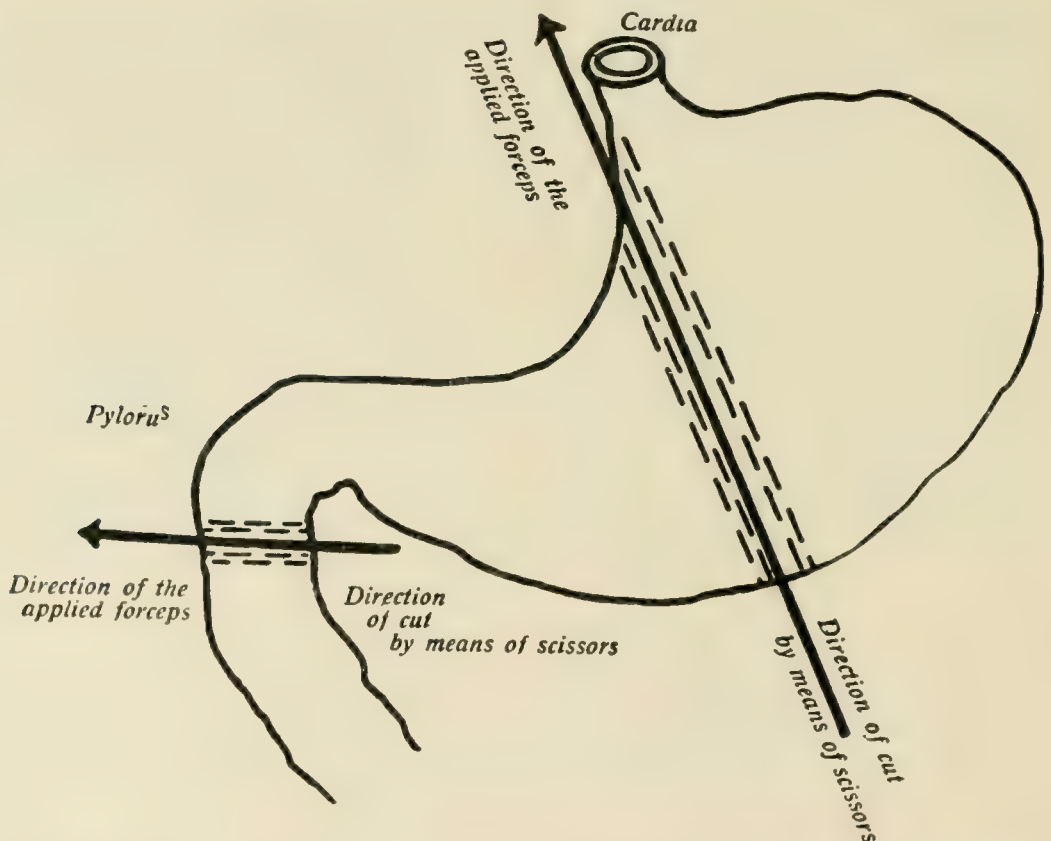


FIG. 22.—Diagram illustrating application of Hülth's instrument in a resection of the stomach.

the intestine. While this is being done, the clamp is gradually closed so that when the sutures nearly meet it is no longer necessary and can be removed. The instrument is more of a convenience than a necessity.

RECENT MECHANICAL DEVICES FOR SEWING THE INTESTINE. *Hüttl's Instrument* (Fig. 21) is a modified book-binding mechanism. It clamps the stomach or intestine and then inserts two parallel double rows of wire staples along the clamped furrow, after which the instrument is opened and removed. The organ (stomach or gut) is cut between the two double rows of staples, which are then invaginated and buried by a running Lembert stitch. Fig. 22 illustrates how a resection of the stomach is accomplished by this method.

The advantages of the instrument are speed, and practically no exposure of mucous membrane. The disadvantages are approximation of mucous to mucus surface so that a proper infolding does not take place, clumsiness, lack of adaptability, and an almost prohibitive cost. In skilled hands, the usual intestinal suture with a needle and thread is simpler, more adaptable, and hence more reliable; under such favorable conditions it is also rapid enough.

Hahn¹ has invented what is apparently a small hand sewing-machine which accomplishes practically the same result as Hüttl's instrument. The illustrations and the text of Hahn's article give a most inadequate idea of his instrument, so that further details are not available.

THE STOMACH

Radiology of the Stomach. The monograph of Clairmont and Haudek,² dealing with the significance of radiology of the stomach for surgery, comprises a short treatise on the diagnosis of diseases of the stomach. The relative value of various symptoms and clinical tests is admirably given. Not only is the comparative reliability of each symptom and test, including radiology, frankly stated, but their limitations are likewise clearly indicated. In experienced hands, the *x*-rays fill many defects in clinical diagnosis with remarkable, almost uncanny, accuracy. In some instances, the combined clinical and *x*-ray examinations fail. The percentage of such failures has been steadily diminishing as experience (diagnosis, controlled by operative findings) increases. The *x*-rays, in conjunction with clinical findings, has proved so useful an aid at the Allgemeines Krankenhaus, in Vienna, that all obscure gastric conditions are referred for radiological examinations, not only for the sake of diagnosis but also for operative indications.

The method pursued by these authors, one of whom is a surgeon, the other a radiologist, was as follows: After obtaining the history and after a physical examination, which included inflation of the stomach

¹ Münch. med. Woch., 1911, No. 36, p. 1919.

² Die Bedeut. der Magenradiologie f. d. Chir., Clairmont and Haudek. Fischer, Jena, 1911.

and a test meal, the patient was turned over to the radiologist who was not informed of the clinical findings until after he had given the result of his own investigation. The diagnoses, so made, were controlled at subsequent operation in over one-third of a series of 200 cases. Based on this experience, the authors have made a classification of cases in which radiography of the stomach may be of service to the surgeon. This classification at the same time indicates the general scheme of reasoning-out differential diagnoses employed by these observers:

1. Diseases of organs distant from the stomach: Brain tumors, tabes, tubercular peritonitis, stasis of the portal system, Addison's disease, etc.; although pregnancy is not a disease, it belongs in this category.

2. Organic disease in the neighborhood of the stomach:

(a) Without influence upon the stomach, but subjectively referred to it.

(b) Anatomically influencing the stomach.

3. Diseases of the stomach itself:

(a) Organic disease—ulcer, cancer, and their sequelæ.

(b) Functional disease—neuroses of secretion, catarrh, ptosis and atony, neurasthenia, and hysteria.

In Group 1, if adequate care is observed in taking the history, a Röntgen examination may often be unnecessary. Even here, in cases of doubt, a negative *x*-ray finding may indicate the true origin of trouble.

In Group 2, the most important condition considered, is where a tumor lies in the epigastric region. Does such a tumor belong to the stomach? It is often possible to decide this by the *x*-rays, and such a decision is not only important for the diagnosis, but also for the prognosis and therapy. We know how frequently, in the history of gallstone disease or pancreatitis, the apparent centre of the trouble is the stomach. Physical examination in some of these cases reveals a tumor or point of tenderness. Experience has shown that the location of these does not prove that they belong to the stomach. For instance, a retroperitoneal tumor of the pancreas or lymph nodes, may give the impression of being superficial, although the stomach actually overlies it. Again, tumors of the omentum, transverse colon, spleen, or left kidney, may be in contact with the stomach contour and, in the absence of any specific symptom on the part of the affected organ, may cause diagnostic difficulty. Mobility of a tumor is often unreliable—a carcinoma of the stomach may be fixed, while a carcinoma of the pancreas may be somewhat movable. In such cases, inflation is useful. Thus, as long as a tumor of the lesser curvature is movable, inflation will regularly cause it to move to the right; tumors of the gall-bladder and liver move upward on inflation—not to the right. Retroperitoneal tumors,

together with those of the posterior wall of the stomach, have the following characteristics in common: the distinctness with which they can be felt, and local tenderness, if present, lessen upon inflation. Carcinomata of the colon, omentum, and fundus of the stomach, are all displaced downward.

Inflation of the stomach has certain disadvantages compared with the bismuth meal test; in the latter case, the stomach possesses a far greater passive mobility, making it possible to determine with certainty, by palpation under the *x*-rays, whether or not a tumor belongs to the stomach. The technical details of this procedure should be read in the original. Space does not allow their quotation here. Let it suffice to say that after filling the stomach with a bismuth mixture and palpating the tumor, it is often possible to separate the two, by proper manipulation. Again, even if the tumor overlies the stomach in part or in whole, if the latter's outline and peristalsis are normal, and if movements of the tumor do not intimately affect the stomach, a close relationship of these two can be denied. On the other hand, if the tumor is found to move with the stomach, and, if there is an irregularity in the normal outline of that organ in the region of the tumor, the latter is certainly intraventricular.

The relationship of points of tenderness to the stomach can be determined in a similar manner. One remark in connection with this is particularly interesting. Clairmont and Haudek state: "We are accustomed to look upon an epigastric point of tenderness to the left of the right parasternal line as belonging to the stomach; so far, signs are wanting to prove such a point of tenderness to be extraventricular." In many instances there is doubt about the relationship of tender points, even with the aid of the *x*-rays. Only when such a point moves with the stomach, is it certain that it belongs to that organ. (This contradicts the views of Mackenzie.¹)

Extraventricular tumors dislocate the bismuth-filled stomach in various directions: Thus, splenic tumors displace it to the right; those of the left kidney, to the right and upward; while pancreatic tumors and those of hepatic origin, move it to the left. Pericholecystitis may cause obstruction at the pylorus, and fixation of that part of the stomach to the liver can be demonstrated by the *x*-rays.

Considering group 3, we shall deal only with organic changes in the stomach wall, and shall ignore the functional disturbances. For practical purposes, grave disease of the stomach wall is one of two things—ulcer or cancer. In a large proportion of cases differentiation of these two is uncertain by ordinary methods. The *x*-ray has proved of enormous benefit under these conditions. We shall briefly enumerate, for the sake of completeness, the usual clinical data on which such a differential diagnosis has heretofore been made:

¹ Symptoms and Their Interpretation.

HISTORY, while characteristic of chronic gastroduodenal ulcer near the pyloric region, is often not reliable with lesions elsewhere. Except for this one positive characteristic (ulcers near the pylorus), it affords no differential points of value.

PALPATION may or may not demonstrate the presence of a mass. If present, it is rarely possible to tell whether such a mass is of benign or malignant character. The tenderness which usually accompanies the growth of carcinoma is not sufficiently characteristic to be of value.

INFLATION. A tumor of the lesser curvature, or of the pylorus lying behind the left costal margin, may become palpable upon inflation. Further inflation may, to a certain extent, lessen the resistance of the abdominal wall, and so permit definite palpation of a hitherto ill-defined tumor. Nevertheless, in many instances, palpation fails to demonstrate gross changes in the stomach wall.

BLEEDING. To correctly determine this, all meat diet must be abstained from for at least three days. This is inconvenient and takes time. Bleeding from other parts of the alimentary tract than the stomach furnishes a source of error here. Recent passage of the stomach tube or rectal examination, may cause blood to appear in the stool; a single negative finding is of no value. In spite of repeated examinations for blood, all negative, extending over a number of days, an ulcer has been found at operation. Boas recommends the guaiac test, and, if this is negative, the phenolphthalein test.

STENOSIS. Where an extreme degree of obstruction exists, the symptoms are unmistakable. Among other phenomena, antiperistalsis is a definite sign of stenosis; it is very rare, it occurs late, hence it is of no value in the diagnosis of beginning stenosis.

Clairmont and Haudek observed, in certain cases, a highly tympanitic area, the size of a dollar, over the antrum, *i. e.*, two fingers' breadth to the right of the median line at the level of the pylorus, which, they state, can properly be considered as a sign of meteorism in front of the pylorus in the presence of stenosis. (This is analogous to the gaseous distention of the cecum in carcinoma of the sigmoid.)

The sign described above is not to be confused with the enlargement of the greater curvature to the right, which is often evident upon palpation and percussion, even before inflation. ("Vergrösserte Rechtsdistanz" of Strauss.) This, according to Clairmont and Haudek, speaks strongly for benign stenosis. The bulged-out part of the greater curvature close to the stenosed pylorus lies in contact with the duodenum. Such cases were the ones which led to the suggestion of performing gastroduodenostomy.

Hour-glass stomach is rarely diagnosed clinically. Spastic stenosis (intermittent hour-glass stomach) is evident by the *x*-rays alone. Experience has shown that only the gastric ulcer is usually diagnosed by the clinician, not the hour-glass deformity which it gave rise to.

Schlesinger and Nathanbluth¹ reported two cases of *hour-glass stomach* which improved remarkably under proper dietetic treatment. They therefore considered that the ulcers and erosions were so improved by proper therapeutic measures, that the spasms and pains vanished. They state that the Röntgen picture often shows a greater degree of stenosis than actually exists; in other words, the lumen is narrowed far more by spasmodic contraction than by actual stenosis. In other words the distress which patients with hour-glass stomach feel, can only, in the rarest instances, be due to so marked a degree of stenosis that an interference with the passage of ingesta exists. Haudek and Clairmont fully agree with this opinion, but do not share the view that temporary improvement by proper diet furnishes a contra-indication to operation for persistent ulcer.

TEST MEAL. Its valuable qualities need not be discussed here. It is well known that ulcer and hyperchlorhydria, carcinoma and achylia, have respectively increased and diminished acidity in common; and that normal acidity does not exclude gross lesions of the stomach wall. Lessened total acidity, absence of free hydrochloric acid, together with the presence of lactic acid, have been repeatedly observed in disease of organs adjacent to the stomach; namely, carcinoma of the gall-bladder, pancreas, or transverse colon. Therefore, such a finding (tumor and diminished acidity) is not characteristic of disease of the stomach wall alone. The presence of lactic acid is not typical of any single condition.

Microscopic examination of test meals has shown that long bacilli occur in stenosis from any cause. The presence of sarcinae with hyperacidity speaks for ulcer. Clairmont and Haudek were never able to identify tumor cells as such. All the tests for determining the amount of nitrogen or proteid in the stomach contents, the various biological methods, and certain urinary examinations, have furnished nothing reliable or useful for practical purposes.

The routine employment of gastroscopy or gastroduaphany, for the diagnosis of disease of the stomach, still lies in the future. (And this in spite of the fact that Elsner in his recently published monograph on gastroscopy, has expressed the enthusiastic hope that this procedure might possibly supplant exploratory laparotomy.)

The usual clinical way of making the differential diagnosis between ulcer and cancer need not be repeated here. It was found that, in carcinoma which is distant from the pylorus, the patients would sometimes report improvement in the local symptoms (pain and vomiting). Investigation showed that, in spite of this subjective local relief, the general condition did not improve. This local improvement is not, as has been usually supposed, the result of the reopening of the

¹ Mitt. a. d. Grenzgeb. Med. u. Chir., xxii, Heft 5.

obstructed lumen by ulceration, but is due to change in the chemistry of the gastric juice; for, at first acidity is approximately normal, with this there is pylorospasm and vomiting; later, achylia follows, with pyloric insufficiency, increased rapidity of expulsion, and hence lessening of local distress. The obstruction by tumors at the pylorus gives rise to steadily progressing symptoms which suffer no diminution.

Obstipation, so extreme as to suggest stenosis of the colon, is regularly present with ulcer and carcinoma of the pylorus. It is usually absent with diffuse infiltrating tumors of the stomach.

THE LOCATION OF ULCER. Clairmont and Haudek state, from their own experience, that certain clinical signs are useful in indicating the site of the gastric ulcer. Thus, the nearer an ulcer is to the cardia, the sooner pain occurs after eating. Pain, one-half hour after eating, speaks for ulcer at the middle of the lesser curvature; one or two hours after meals, ulcer in the pyloric region; with stenosis of the pylorus, pain comes on from four to six hours after taking food. (It may be remarked here that this relation between proximity of the ulcer to the cardia and the time of onset of hunger pain, is an old subject and is still a matter of dispute.)

Another aid in determining the location of the ulcer is the dependence of pain upon certain attitudes. Thus, pain upon lying on the left side indicates ulcer of the lesser curvature; pain upon standing is found in ulcer of the greater curvature; lying upon the back evokes pain with ulcer of the posterior wall. The diminution of tenderness and pain upon inflation has been spoken of before.

The definite facts to be obtained by *x*-ray examination are briefly enumerated below.

A *Local Addition to the Shadow of the Normal Outline of the Stomach* (which was filled with bismuth), indicates a chronic penetrating ulcer "Nischensymptom" (Fig. 23). (This was mentioned last year in *PROGRESSIVE MEDICINE* for June.) Haudek has observed this symptom in 40 patients. In one case where this symptom was found with a carcinoma, the carcinoma had arisen from the walls of a penetrating ulcer. The presence of this symptom with tumor speaks for ulcer rather than carcinoma.

A sharply outlined, local indentation of the stomach wall, such as seen in spastic hour-glass contraction (see Fig. 24 also Fig. 26 (*E*)), even without the above-described "nischensymptom," speaks for ulcer. Schwarz¹ says that spasms of the circular muscles of the stomach (abnormally deep tonic contractions) are characteristic for lesions of the mucous membrane in the periphery of any given muscular ring. It is still a matter of dispute whether spastic hour-glass stomach is due to purely functional disturbances, or, to an ulcer not demonstrable by the *x*-rays.

¹ Fortschr. a. d. Geb. d. Röntgenstrahlen, Band xvii, Heft 3, p. 138.

Displacement to the right, with dilatation and atony, speaks for pyloric stenosis. Displacement to the left occurs in shrinkage due to diffuse carcinoma or diffuse chronic inflammation.

MOTILITY. If the stomach is empty after six hours, it indicates that no florid ulcer is present.

A spastic pylorus, when it relaxes, allows coarse particles of food to pass; organic disease of the pylorus which, although stenosed, stands open, prevents the passage of raisins, pieces of bread, etc.

Spasm of the pylorus goes with ulcer anywhere in the stomach; achylia or diminished acidity (insufficiency of the pylorus) goes with carcinoma.

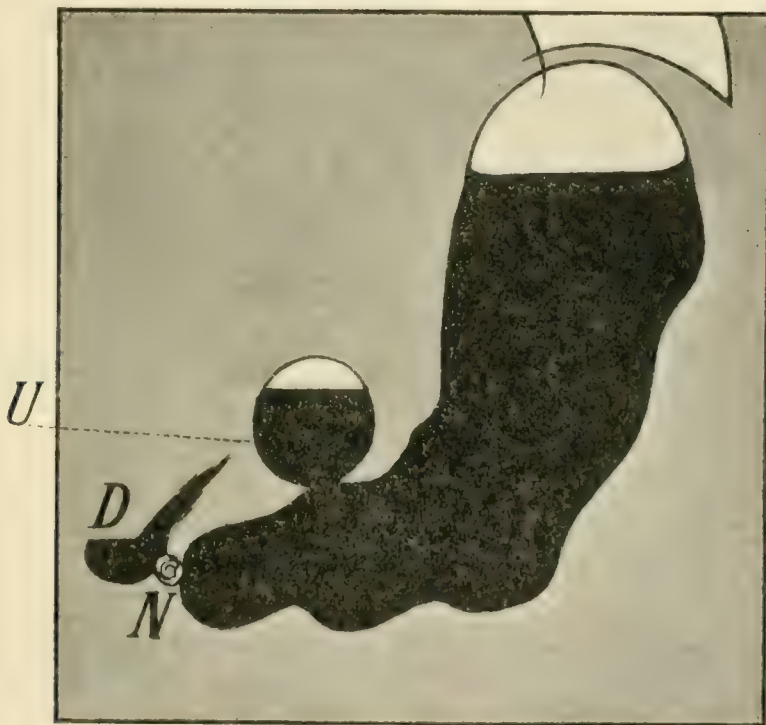


FIG. 23.—*U*, large penetrating ulcer (an inflammatory tumor was present in this case); *N*, umbilicus; *D*, duodenum (first part); ulcer is indicated (*U*) by the localized bismuth mass with its superimposed air bubble. (After Haudek.)

Ulcer increases the normal shadow of the stomach. Carcinoma lessens the normal stomach outline (invades it).

Carcinoma of the body, be it however large, so that it projects into, and markedly narrows the lumen of the stomach, shows no residue after six hours, because the pylorus is free. In the vast majority of instances, an ulcer anywhere in the stomach (say at the lesser curvature), shows a residue at the end of six hours. Also, prepyloric tumors with a six-hour residue have usually been proved to be callous ulcers at laparotomy.

THE DIFFERENTIAL DIAGNOSIS OF HOUR-GLASS STOMACH. *Ulcer.* Provided the pylorus is normal, a six-hour residue speaks for hour-glass

stomach due to ulcer, while motility is undisturbed in carcinomatous hour-glass stomach. The stoma, in hour-glass stomach due to ulcer,

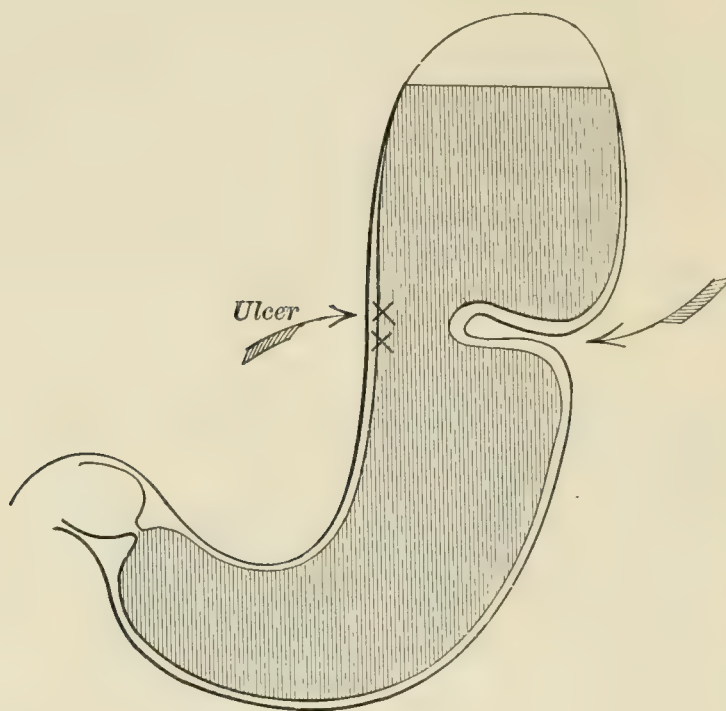


FIG. 24.—Local spasm of stomach due to ulcer. (Schwarz.)

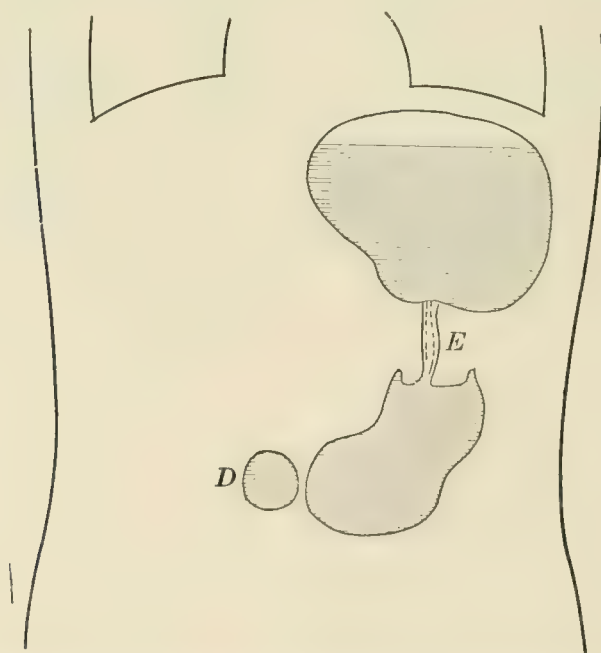


FIG. 25.—Carcinomatous hour-glass stomach with dilatation of upper sac and pyloric insufficiency: *E*, indicates narrowing of pars media; *D*, bulbus duodeni. (Haudek.)

lies along the lesser curvature—in other words, the outline of the lesser curvature is undisturbed, the greater curvature being drawn up to the

lesser. If any small irregularity of contour due to ulcer exists, it is along the lesser curvature (Fig. 24).

In carcinomatous hour-glass stomach, which, by the way, is much rarer than that due to ulcer, the deformity arises from the concentric shrinkage of a diffusely infiltrating tumor. The stoma lies in the stomach axis (Fig. 25). The narrowing, in hour-glass stomach due to ulcer, occurs at one distinct point. The canal is short (Fig. 24). In carcinoma, the narrow channel connecting the two sacs is much longer (Figs. 25 and 26).

In carcinomata of the pars pylorica, there is marked hypermotility due to achylic pyloric insufficiency.

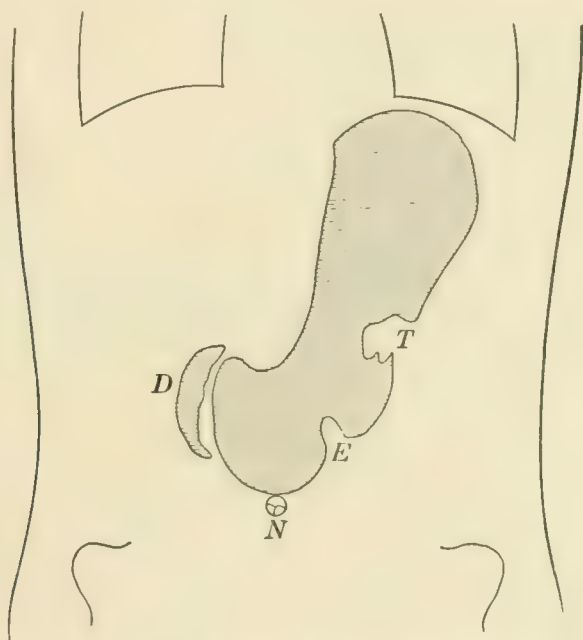


FIG. 26.—Medullary carcinoma of the greater curvature probably on ulcer basis (of posterior wall or lesser curvature): *T*, ragged defect in Bismuth shadow, characteristic of medullary carcinoma; *E*, clearly outlined indentation, such as usually is seen due to ulcer. (Such a contraction is due to ulcer anywhere in circumference of that particular circular segment of the stomach—ulcer is not visible.) *D*, duodenum; *N*, umbilicus. (Haudek.)

Pyloric stenosis proper shows marked differences, depending upon whether it is due to ulcer or cancer. In cancer, disturbances of motility and dilatation never reach the extreme grade seen in ulcer. Infiltrating carcinoma of the pylorus causes insufficiency, so that the time of emptying the stomach remains practically normal, or may even be shortened.

Up to the present time, it is frankly conceded, that early carcinoma arising on an old ulcer cannot be diagnosticated. This is not strange, since it is common that serial sectioning of a tumor mass is necessary to determine whether carcinomatous elements lie at its centre. Small flat carcinomata cannot be detected by *x*-ray examination.

Under certain circumstances it is possible to determine the *character of a carcinoma* with tolerable accuracy:

1. *Well-developed Carcinoma Arising from a Callous Ulcer.* Closely adjoining the "Nischensymptom" (localized widening of the normal

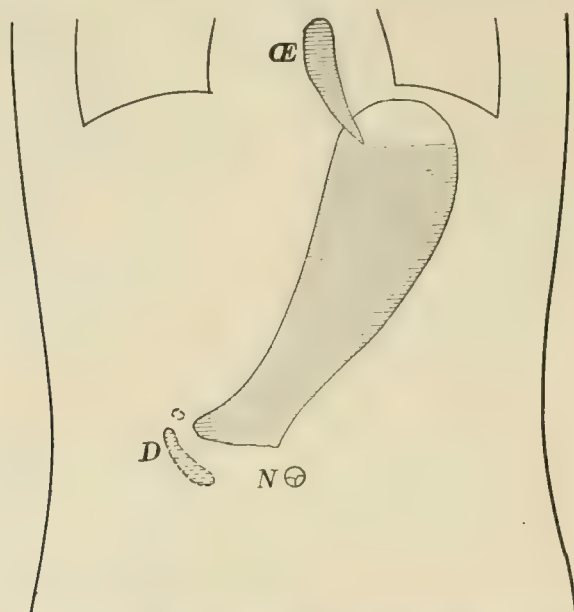


FIG. 27.—Diffusely infiltrating carcinoma, insufficient distensibility and angular contour of the pars pylorica, slight distention of pars cardiaca. Low site and insufficiency of the pylorus. Stasis in œsophagus. *D*, duodenum; *N*, umbilicus; *Æ*, œsophagus. (Haudek.)

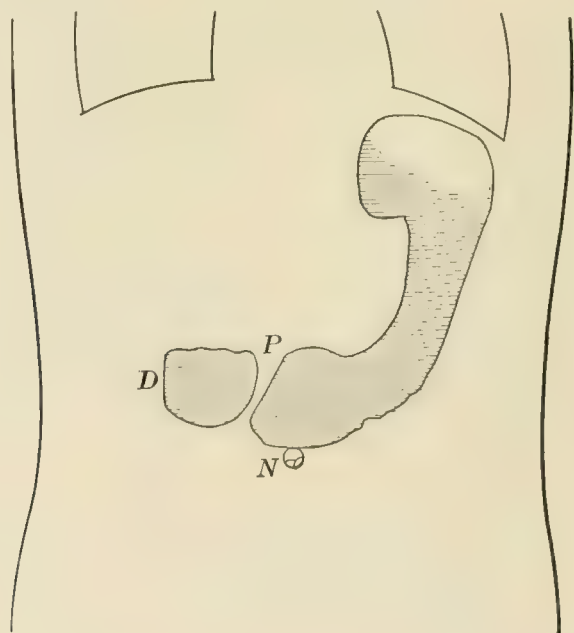


FIG. 28.—Diffusely infiltrating carcinoma involving middle part of stomach. Marked filling of duodenum due to extreme grade of pyloric insufficiency. *P*, pylorus; *D*, duodenum; *N*, navel. (Haudek.)

stomach outline) is seen a diminution of the normal contour; that is, close by a local widening of the lumen is situated a local narrowing.

2. *A Fungus Carcinoma which Invades the Normal Stomach Outline.* This is sharply outlined against the adjacent healthy wall and frequently does not change the shape or size of the stomach (Fig. 26).

3. *A Diffusely Infiltrating Carcinoma* causes no marked local invasion of the normal contour, it only narrows the entire pars pylorica (Fig. 27) or pars media (Fig. 28). In the latter case, carcinomatous hour-glass stomach which is present, leads to secondary dilatation of the upper sac.

Codman's¹ quotation of Holzkecht (Haudek's chief) best indicates the array of definite conclusions which can be drawn from certain combinations of *x*-ray and clinical data. He writes: "Holzkecht has arranged those (data) which apply to the stomach in a very graphic way by heading them under certain symptom-complexes. For instance:

"Symptom-complex I: (1) Bismuth residue in stomach after six hours. (2) Normal stomach shadow on screen. (3) Achylia. Diagnosis: Small carcinoma of pylorus.

At first sight this diagnosis seems miraculous, but, logically, it is perfectly simple.

It is known that achylia is always associated with hypermotility if the pylorus is free. Now a residue after six hours shows that either an organic or spasmodic stricture of the pylorus exists. Spasmodic stricture is ruled out, because spasmodic stricture occurs only in the presence of hyperacidity. Since not only hyperacidity is absent, but there is no acidity at all, the stricture must be organic and must be cancer. It shows that the cancer must be small, because were it not, the shadow of the stomach would be abnormal, *i. e.*, enlarged or contracted, or indicate a change of contour.

Holzkecht gives eleven such combinations of symptoms each of which suggests a logical diagnosis:

"Symptom-complex II: (1) No residue after six hours. (2) Marked defect in gastric shadow. (3) Horn-shape of stomach. Diagnosis: Carcinoma. No stenosis. Inoperable.

"Symptom-complex III: (1) No residue after six hours. (2) Marked defect of stomach shadow in the pars media or the pars pylorica. (3) Hook-shaped stomach. Diagnosis: Carcinoma of the stomach. Operable.

"Symptom-complex IV: (1) Small residue after six hours. (2) Sensitive pressure point over the stomach. (3) Normal stomach shadow. Diagnosis: Simple gastric ulcer.

"Auxiliary signs of stomach ulcer: (1) Antiperistalsis. (2) Displacement of the pylorus upward and to the left. (3) Snail form of lesser curvature. (4) Stable transverse contraction. (5) Changing transverse contraction.

"Symptom-complex V: (1) Small bismuth residue after six hours. (2) Pressure point. (3) Displacement upward and to the left. (4) Snail form of the stomach shadow. Diagnosis: Old contracting ulcer on the lesser curvature of the pars pylorica.

¹ Boston Medical and Surgical Journal, January, 1912.

"Symptom-complex VI: (1) Small bismuth residue after six hours. (2) Pressure point and resistance in the pars media. (3) Transverse contraction of the pars media. (4) Diverticulum with air bubble in the smaller curvature, immovable. Diagnosis: Callous ulcer of the small curvature of the pars media."

(Haudek has sought in vain for an ulcer without spasm of the pylorus, or for a case of six hours' delay of the bismuth residue without serious alteration in the gastric wall.)

"Symptom-complex VII: (1) Large sickle-shaped bismuth residue after six hours. Diagnosis: Old stenosis of the pylorus due to ulcer.

"Symptom-complex VII *a*: (1) Large residue after six hours. (2) Dilatation. (3) Loss of tone. Diagnosis: Old ulcer-stenosis.

"Symptom-complex VIII: (1) Large sickle-shaped residue. (2) Marked defect in the filling of the pars pylorica. Diagnosis: Carcinoma of the base of an old ulcer with stenosis.

"Symptom-complex IX: (1) No bismuth residue after six hours. (2) Marked defect in the shadow of the pars pylorica and pars media. (3) Transverse constriction of the greater curvature. Diagnosis: Carcinoma on the base of an old ulcer. No stenosis.

"Symptom-complex X: (1) Stomach empty after six hours. Head of the bismuth column at the splenic flexure of the colon. (2) Shortening of the stomach. (3) Constriction at the cardia. Diagnosis: Carcinoma of the pars cardiaca.

"Symptom-complex XI: (1) Stomach empty after six hours. Head of bismuth column in the ascending colon. (2) Stomach shadow normal. (3) Pressure-point moving with the duodenum. Diagnosis: Duodenal ulcer."

The following is the grouping of factors in the presence of a normal stomach:

"Symptom-complex XII: (1) Stomach empty in six hours. Head of the bismuth column in the ascending colon. (2) Stomach shadow normal. (3) No increase of peristalsis; no antiperistalsis. (4) No sensitive pressure point. (5) Hydrochloric acid normal."

Concerning this he says: "In no case showing these signs have we found anatomical alterations upon operation, or postmortem examination." Inversely: "We may say, however, that hitherto we have met with no case of serious alteration of the gastric walls without a corresponding alteration in the symptom-complex."

Codman then continues: "Unfortunately in duodenal ulcer which, at least hereabout, is more common than gastric ulcer, the *x*-rays give us little help, hypermotility being the only thing associated with it by radiologists until stenosis occurs, and a residue after six hours becomes visible. Usually in cases which need operation, however, such stenosis has occurred."

Spastic Hour-glass Stomach was accorded passing mention when reviewing Clairmont and Haudek's monograph. It seems proper to lay special stress upon this phenomenon's characteristics, because they illustrate the folly of relying upon a single *x*-ray plate in establishing a diagnosis of hour-glass stomach. Groedel and Levi¹ state that such a stomach is at times cow-horn in shape, at others it shows a siphon form. The transverse colon is unusually movable; there is a distinct relationship between the occurrence of abnormal position of the transverse colon and abnormal contour of the stomach. *Intermittent hour-glass stomach* is present both in the vertical and recumbent positions; this form is retained through any given period of gastric digestion, and *is not affected by the administration of atropine*. On certain days, an insufficiency of the pylorus is also present (intermittent pyloric insufficiency). Groedel and Levi believed that the conditions observed were evidences of a gastric neurosis secondary to perigastric adhesions or erosions.

Acute Perforation of Gastroduodenal Ulcers was the subject of a careful statistical study by Petré², who collected a series of 100 operated cases from hospitals in the south of Sweden. The following observations made by him are of surgical interest:

Neither trauma, nor different degrees of fulness of the stomach, seem to predispose to perforation. Afternoon and evening was the time of day when perforation most frequently occurred. The majority of ulcers which perforated were old callous ulcers, not recent ones. Examination of the previous histories showed that, in over half the cases, the patients had suffered for years with symptoms of ulcer and, further, a considerable number of these had suffered from such symptoms for some time immediately before perforation. In a smaller number of cases (10 out of 89) the ulcer—especially duodenal ulcer—was practically latent previous to perforation. It was often noticed that immediately before perforation, there was an exacerbation of the previously existing gastric symptoms.

Although the perforation was usually sutured, it was found that in selected cases, excision of the ulcer-bearing area did not increase the gravity of the prognosis. Regarding late results, it seemed that the individuals with no ulcer symptoms previous to perforation, were apt to be free from subsequent trouble; while those in whom symptoms of ulcer had been present for years were likely to have a continuance of their sufferings. In other words, an acute ulcer is more prone to heal than a chronic one.

The Blood Supply of the Duodenum is the title of an article of much interest by Wilkie;³ special reference is made to the supraduodenal

¹ Fortschr. a. d. Geb. d. Röntgenstrahlen, Band xvii, Heft 2, p. 55.

² Beit. z. klin. Chir., Band lxxii, Heft 2.

³ Surgery, Gynecology and Obstetrics, vol. xiii, No. 4, p. 399.

artery. "Chronic ulceration in other parts of the body is usually found in association with vascular insufficiency." Using this as a starting point, Wilkie states, inasmuch as the first portion of the duodenum is situated on the borderline between the areas supplied by the celiac axis artery on the one hand, and by the superior mesenteric artery on the other, that this affords some foundation for the theory of vascular insufficiency. In order to determine how free the anastomosis between the celiac and the superior mesenteric arteries was, Wilkie injected, in several bodies, the gastroduodenal artery, and, in several others, the superior mesenteric artery. When the gastroduodenal was injected, the medium travelled freely into the vessels of the second, third, and fourth parts of the duodenum, and into those of the first few feet of the jejunum. The first part of the duodenum, however, showed, in many cases, a characteristic and striking appearance, namely, that an area, corresponding to the upper half of the first one and one-half to two inches of the duodenum, remained uninjected. And, further, injection of the superior mesenteric artery, after ligature of the gastroduodenal artery, showed that there was a free anastomosis between the two pancreaticoduodenal arteries, and gave a plentiful injection of the duodenum up to its first part, but failed to inject the "critical area," *i. e.*, the upper two-thirds of this first part.

Further differential injections proved that the "critical area" of the first portion of the duodenum has normally an independent source of blood supply. In every case, the arterial branches descended over the duodenum from a trunk which had its origin at a higher level than the mid-point of the gastroduodenal artery. This vessel Wilkie has termed the "*supraduodenal artery*." Its origin is variable, and while, in the majority of cases examined, it arose from the upper part of the trunk of the gastroduodenal artery, in other cases, it was found springing from the common hepatic trunk, from the right, or from the left hepatic branches, or from the cystic artery. In these cases, when injected, it formed a very striking picture, and impressed one with the precarious nature of the blood supply of this part of the intestine.

In all, forty cadavers were injected. In the majority of these, the supraduodenal artery appeared to be an end artery. In some cases, twigs communicated with the pyloric artery, or with the duodenal branch of the right gastro-epiploic artery; the anastomosis was, however, never a very free one.

In four of the forty injected bodies, there was definite evidence of old duodenal ulceration, undiagnosed before death. Investigation of these showed that the first one-half to three-quarters of an inch of the upper border of the duodenum, especially on the posterior aspect, had a very indifferent arterial supply. . . .

In several cases a ligature was applied to the supraduodenal artery, and the celiac axis artery was then injected. In these cases, an unin-

jected area was left, and this corresponded almost exactly to the limits of the critical or ulcer-bearing area (Fig. 29). As said before, the vessels in this area of the duodenum, just beyond the pylorus, had few, if any, anastomotic connections with the pyloric branches, which is of interest, in view of the fact that this area of the duodenum is probably the commonest site of perforating ulcer.



FIG. 29.—Injection of celiac axis artery after ligation of the supraduodenal artery, showing area of pallor of first part of duodenum. Note origin of hepatic artery. (Wilkie.)

Wilkie's injections also demonstrated that "the arterial anastomosis in the stomach is much freer in its cardiac portion than in the pyloric antrum; and that, in the pyloric antrum, the anastomosis is better marked along the greater than it is along the lesser curvature. This fact, when taken in conjunction with the extraordinary anemia which is produced in the pyloric portion of the stomach during spasmodic contraction, may have a bearing on the etiology of chronic gastric ulcer, and explain, by the vascular theory, its relative frequency in the pyloric antrum."

Regarding the relationship of arterial supply to chronic duodenal ulcer, Wilkie ventured the opinion "whatever be the initial determining cause of a duodenal ulcer, its chronicity, and its tendency to recurrence

is probably due to a paucity of vascular supply. The regularity with which chronic duodenal ulcers are found in the zone supplied by the supraduodenal artery, and the fact that, in many instances, this vessel appears to be practically an end artery, lends weight to this view. In the scar of a duodenal ulcer, a certain amount of periarteritis is invariably found. If the vessels involved in the scar tissue be end arteries, it is not surprising that a tendency to recurrence of ulceration in these cases should be the rule."

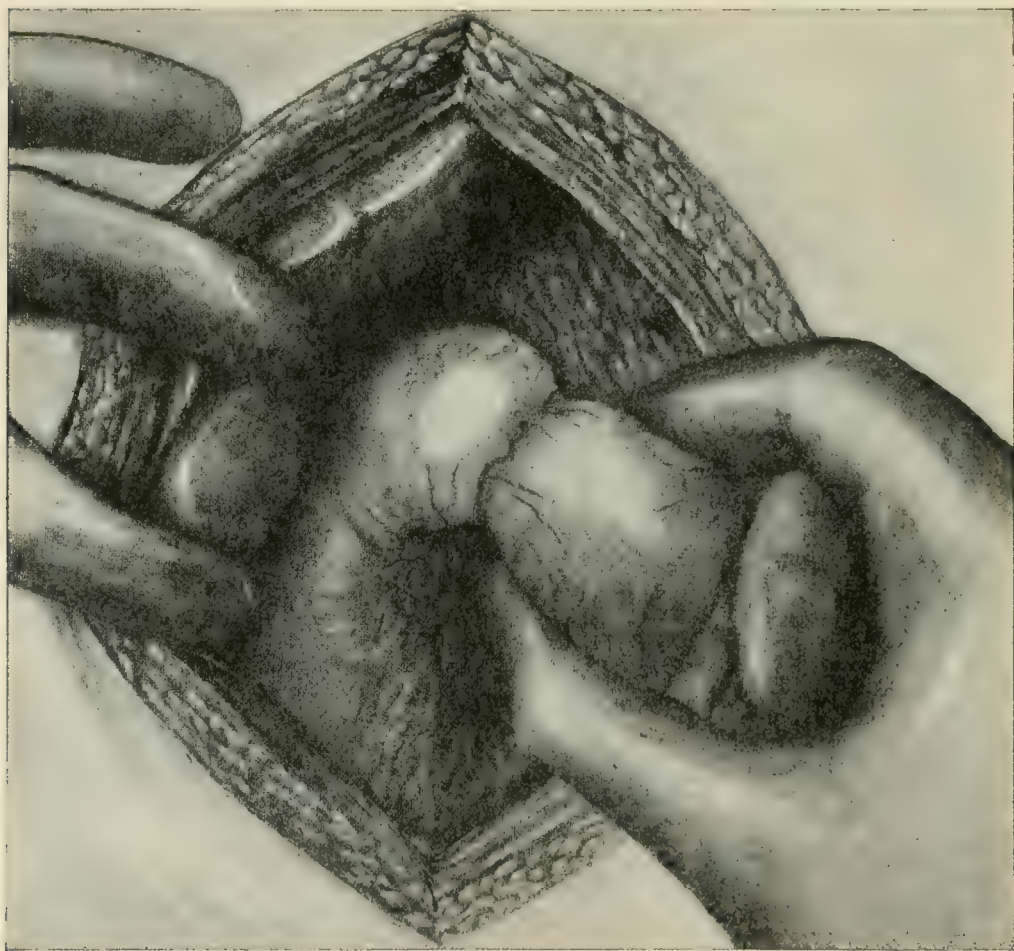


FIG. 30.—Anemic spot resembling an ulcer on the duodenum. Showing effect of traction on the pyloric end of the stomach for the purpose of exposing the pylorus and upper duodenum, which may cause an anemic spot resembling an ulcer to appear on the upper duodenum. (Mayo.)

Reference was made to the article by W. J. Mayo on an anemic spot of the duodenum.¹ In this connection Wilkie states "that the position of this spot corresponds to the centre of the area supplied by the supraduodenal artery. In these cases it is highly probable that this vessel, arising at a high level, and running down to the duodenum, has its lumen narrowed or obliterated when put on the stretch.

¹ Surgery, Gynecology, and Obstetrics, June, 1908.

Results of Surgical Treatment of Gastric and Duodenal Ulcers. The most important recent communication concerning ulcers of the stomach and duodenum, especially the end results of their treatment, comes from the pen of W. J. Mayo.¹ He reports a series of 1000 operations, done by himself and his brother, for indurated ulcer of the stomach and duodenum. The entire article is replete with valuable information, and is worthy of study in the original by any one who desires to be *au courant* with the present status of this field of abdominal surgery. Only the most prominent facts will be mentioned here.

It was interesting to see that in a number of cases in which ulcer symptoms existed, while no evidence of ulcer of the duodenum or stomach was found at laparotomy, nevertheless at a second laparotomy, performed some months later because of continued symptoms, an ulcer was found. Regarding this Mayo says: "Either the ulcer had been overlooked at the primary operation, or it had been confined to the mucous membrane, and the musculoperitoneal coats were involved later. This is a question which must be cleared up by further investigation."

Since more accurately classifying ulcers around the pylorus, it was found, that in 621 cases from June 1, 1906, to January 17, 1911, 201 (32.5 per cent.) were gastric, 401 (64.5 per cent.) duodenal, and 19 (3 per cent.) showed an ulcer in each viscus. In short, 2 out of every 3 cases of gastroduodenal ulcer are situated in the duodenum rather than in the stomach.

Of the 1000 cases, 745 were in men and 255 were in women, thus settling once and for all the relative frequency of this condition in the sexes.

In over 95 per cent. of the cases, the chronic indurated ulcer was single.

The greater number of gastric and duodenal ulcers were situated within two inches of the pylorus, and it was found that all of these gave a fairly definite clinical picture, namely, hunger pain, food relief, etc.

As regards the gastric analysis, hyperacidity was fairly constant in the early stages, while in older people, and in longer standing disease, the acidity was normal or below normal. These findings are interpreted by some internists as showing that with ulcer, an accompanying gastritis is always present, and hence the varying degrees of acidity correspond to the different stages of this coexisting gastritis.

Food retention, especially the finer degree of obstruction in which small particles were found in the stomach eight, ten, and twelve hours after meals, is considered by Mayo to be a most important diagnostic sign. "Other things being equal, food retention is an indication for surgical interference."

¹ Annals of Surgery, September, 1911, p. 313, also Transactions of American Surgical Association, 1911.

With ulcer of the body of the stomach, the symptoms were not so clear, and their order of occurrence was irregular.

Hemorrhage, both obvious and occult, unless accompanied by other symptoms of ulcer, was found to be of less diagnostic importance than had been supposed.

According to Mayo, indications for the surgical relief of chronic ulcers of the stomach and duodenum are divided into positive and relative classes—positive if obstruction, repeated hemorrhages, and severe pain or insufficient state of nourishment exist; relative, when for one or more of these reasons, chronic disability interferes with the individual's daily calling.

The classification of end results, showing what good surgery has actually accomplished in this field, follows:

“First, gastric ulcers: (a) Ulcers with obstruction, pyloric or hour-glass; (b) ulcers without obstruction, usually ulcers of the body of the stomach.

“Second, ulcers of the duodenum treated by (a) gastrojejunostomy, with or without infolding the ulcer; (b) ulcers excised, with or without pyloroplasty or the gastroduodenostomy of Finney.”

The operative mortality in this collection of 1000 cases was 2.4 per cent., a marked improvement over that shown by most of our continental brethren.

It was found that ulcers which had caused either potential or acute obstruction presented a high percentage of cures.

In 19 cases of duodenal ulcer, excision was done with or without pyloroplasty or the gastroduodenostomy of Finney. The cases in which excision, whether with or without pyloroplasty, was done, were not as satisfactory as those treated by gastrojejunostomy. This lack of success was explained by the tendency of adhesions to form around the pylorus after plastic operations in that region. Here in spite of the presence of an adequate opening, the progress of food was apt to be delayed and painful. The gastroduodenostomy of Finney gave much better results than those following pyloroplasty. In fact, the late results, in all cases in which Mayo employed the Finney operation, were excellent.

All gastric ulcers which were situated close to the pylorus and were accompanied by obstruction, were relieved by gastrojejunostomy, irrespective of whether the ulcer was excised or not. Nevertheless, whenever it was possible, the ulcer was excised because of the well-known danger of carcinomatous change.

Hour-glass stomach was treated both by gastro-gastrostomy and gastro-jejunostomy, as well as by circular resection. Of these, gastro-jejunostomy gave complete subjective relief, while circular resection, which removed the danger of cancer development in the scar, did not afford the patients as great a degree of comfort as the aforementioned gastrojejunostomy.

When ulcers of the body of the stomach, without obstruction, were encountered "especially those deep excavations adherent to the pancreas, etc," excision did not give satisfactory results. A combination of gastrojejunostomy and excision gave much better results, but even here the results were not as good as those obtained in pyloric stenosis and duodenal ulcer.

Jejunostomy, for jejunal feeding with complete rest of the stomach for some weeks, was necessary in a few cases with very extensive ulceration of the body of the stomach.

Mayo concludes by saying: "From the above data it is very evident that operations for duodenal ulcers present a higher average of cures than operations for gastric ulcers. Gastro-jejunostomy, with or without infolding the ulcer, not only affords great relief to the patient with duodenal ulcer, but also gives a permanent cure in a remarkably high percentage of cases."

The Mayo's statistics indicate: "First, that the treatment of all duodenal and all obstructing ulcers of the pyloric end of the stomach, by gastrojejunostomy and excision, or infolding of the ulcer, is satisfactory, and gives 98 per cent. of cures or of great improvement. Second, 85 per cent. of the ulcers of the body of the stomach will either be cured or greatly relieved by excision, or devitalizing suture compression with gastrojejunostomy. In addition, closure of the pylorus may be practised with benefit." In the remaining 15 per cent. of cases, although the benefit obtained by operation was not marked, the sufferings were not made worse. "The mortality of the surgical treatment of chronic gastric and duodenal ulcer is well under 2 per cent."

Gastroduodenal Ulcer—its Complications and Treatment. Petrén,¹ of Borelius' Clinic, in Sweden, has published an extremely careful, analytical study with this title. Many of the facts and ideas presented are deserving of repetition.

In his introductory remarks Petrén says that a systematic inquiry into the subsequent history of operative cases often shows the later results of gastro-enterostomy to be unsatisfactory. Prominent among the grave complications are peptic jejunal, or gastrojejunal ulcer, and, chief of all, subsequent cancer of the stomach.

The sane view expressed by Dahlgren is then quoted, namely, that the choice of operative procedure should depend to a certain extent upon the experience and actual ability of the individual surgeon; for instance, a skilled technician should consider himself not only justified but required, to carry out a more radical procedure, where a less experienced colleague would by right, and in the interest of his patient, limit himself to the performance of gastro-enterostomy alone.

Petrén collected the records of 283 individuals upon whom 328 laparotomies had been performed.

¹ Bruns' Beitr. zur klin. Chir., Band lxxvi, Heft 2, p. 305.

SYMPTOMS PREVIOUS TO OPERATION. It was found in considering these, that practically half of the patients had suffered from gastric symptoms for at least ten years, and that over two-thirds had been aware of such trouble for at least five years. Of the various symptoms enumerated, pain and vomiting were present in 205 cases, a palpable abdominal tumor was present in 45, and in about half of the cases, vomiting of blood, or blood tinged movements, were present at some time or other. Practically a quarter of the patients had had previous hospital treatment (medical) for ulcer, and further, close investigation of the remaining histories showed that the majority had undergone medical treatment for their gastric trouble.

LOCATION OF ULCER. It was found, that in men, the callous ulcers had their site most frequently at the pylorus or in the duodenum, whereas in women, the same proportion showed the ulcer site to be on the lesser curvature, or, in the middle or cardiac parts of the stomach. In this connection, it is interesting to note that hour-glass stomachs occurred much more frequently in women than in men; indeed, in Finsterers' series of over 200 cases, 80 to 90 per cent. of the patients with hour-glass stomach were women.

Gastric Motility. Repeated examinations showed that there were certain individuals in whom, at times, retention was present, while at others it was absent. Other cases revealed more or less severe pyloric obstruction (at operation), nevertheless had no retention at the end of twelve hours. Certain cases showed retention, but no pyloric obstruction. In these the retention was due to a perigastritis, or a large inflammatory tumor (ulcer), or thickening of the stomach wall along the lesser curvature. However, the majority of cases with duodenal or pyloric ulcer, or with hour-glass condition, showed retention after twelve hours.

Test Meal. Of the 179 ulcer cases, 11 per cent. had low total acidity, 36 per cent. had practically normal acidity, and 53 per cent. had a higher acidity than normal, and among this last group were a number with extremely high acidity.

Coexisting Conditions. Besides the ulcer, in a number of cases there was a pulmonary tuberculosis; in others, chronic nephritis, and, in yet others, gallstones. Gastric tetany was noted in four cases.

Petrén's remarks in discussing the results of treatment are so apt that they deserve repetition here. He says: "Certain previous authors desired to compare the results of medical and surgical treatment of gastric ulcer, and they attempted to determine the percentages of healed, improved, unimproved, and fatal cases, in large, parallel series of patients treated by both these methods; then, from these statistics, they tried to draw conclusions regarding the relative merits of the two types of treatment. Such attempts to compare the therapeutic worth of medical and surgical treatment are worthless. The majority of

patients, who are treated by medical means, have uncomplicated ulcers for which operative treatment is not indicated; on the other hand, the cases which come to the surgeon, show complications in the majority of instances, against which medical treatment has been of no avail. Under such circumstances, to compare the results of medical and surgical treatment, employed upon two groups of ulcer cases of wholly diverse character, can be of no interest and is of itself without sense."

OPERATIONS, THEIR IMMEDIATE RESULTS AND COMPLICATIONS. Petrén's series showed more retrocolic posterior gastro-enterostomies than any other type of operation; this is in accordance with general experience.

Formerly the Murphy button had been used much more frequently than of recent years. In a number of cases, the button, instead of passing through the alimentary tract, had fallen back into the stomach and stayed there.¹

Mortality. It seems as though, in spite of the low mortality of operators like the Mayos, Moynihan, and others (between 2 and 3 per cent.), the surgeons of South Sweden apparently consider 5.5 per cent. for gastro-enterostomy, and 14 per cent. for resection followed by gastro-enterostomy, as fairly satisfactory figures.

Hemorrhage as a Complication of Operation. It was found that hemorrhages which were either dangerous to life, or indeed fatal, could occur both from recent ulcers of minute size, and from the bed of large, penetrating, callous ulcers. The bleeding ulcer remained practically unaffected by gastro-enterostomy. The irregular character of hemorrhage from ulcers, readily accounted for the coincidence where bleeding ceased after operation.

The value of Rovsing's gastrodiaphanoscopy at laparotomy, in determining the source of such hemorrhages, was referred to *in extenso* in PROGRESSIVE MEDICINE for June, 1911.

Notwithstanding his rather extensive consideration of hemorrhage from the stomach after operation Petrén says nothing of the fact that the posterior suture line in gastro-enterostomy is prone to bleed.

Vicious Circle occurred rather frequently. At relaparotomy for this, kinks and adhesions were found to be its cause in the majority of instances. Entero-anastomosis was successful in curing the condition, provided the patient was not too far gone at the time.

LATE RESULTS OF OPERATION, as determined by clinical and Röntgen ray examinations, were as follows: A few patients enjoyed a period of health for from five to thirteen years after operation (gastro-enterostomy) but, nevertheless, at the end of this time, again suffered from symptoms of ulcer. Naturally it was impossible to follow all the cases.

¹ It has been stated, that only in those gastro-enterostomies done with the Murphy button, has a subsequent closure of the anastomotic opening occurred.

In a consideration of the 243 cases collected, it was found that they separated into three groups: (1) Those who felt entirely well after operation; in other words, the cases with wholly satisfactory results. (2) Those who later on had moderate symptoms of gastric disturbance; that is, the cases which, to a certain extent, were improved. (3) Those who had marked gastric disturbance, in whom, therefore, the results could be called quite unsatisfactory.

Pétren was able to follow one-third of the cases for at least five years after operation, and two-thirds for at least three years. In this series, fully half of the patients were free from symptoms, while the other half had more or less trouble. He states, that even in the latter group, the symptoms, although present, were not as severe as before operation, thus, it could justly be said that the patients had been relieved of a certain proportion of their sufferings—that their illness had been made somewhat more endurable. In this connection gain in weight served as a good indication of improvement. Two-thirds of the patients gained 10 kilograms, and two-fifths of them gained at least 15 kilograms after operation. Some individuals gained their weight rapidly within a short time after operation—while others gained very gradually and steadily for several months.

The stomach secretion after gastro-enterostomy was unchanged in over half of the ulcer cases.

The various *types of operation employed*, were compared with regard to permanent cures effected. It was found that pyloric resection, or simple excision followed by gastro-enterostomy, gave equally good late results. On the other hand, excision alone, or segmentary resection (circular resection), gave less satisfactory results; while, pyloroplasty and loosening of adhesions, gave bad results.

The various forms of gastro-enterostomy were considered together, and it was found that satisfactory conditions had existed in more than half the patients, for from two to twenty years afterward. About one-quarter had slight, and another quarter had grave, gastric symptoms. This seemed to agree fairly well with the results of previous authors, namely, that in about 75 per cent. of the cases of gastro-enterostomy, the results could be looked upon as satisfactory. The latest report from the Mayos' clinic, reviewed elsewhere, gives a much higher percentage of cures.

In sifting the evidence presented in the form of untoward symptoms after operations on the stomach, it is well to remember, that other conditions, such as tuberculosis of the peritoneum, pulmonary tuberculosis, anemia, neurasthenia, or hysteria, may be the actual basis for such complaints. Putting these aside, however, it must be conceded that, in the vast majority of cases, gastric ulcer itself, or one of its complications, or some complication of the previously performed operation, is responsible for the trouble.

The *complications* noted in the histories of patients previously operated upon for gastroduodenal ulcer could be divided into the following groups: *Persistence of the ulcer*, for which the primary operation had been performed. This occurred in cases where gastro-enterostomy or pyloroplasty constituted all that was done to cure an existing gastric ulcer. In 3 cases which came to relaparotomy on account of pain and vomiting, an unhealed ulcer was found. It was noteworthy that, as long as the patients were free from gastric disturbance, they enjoyed regular and normal movements of the bowels, whereas those in whom gastric disturbance was present, were subject to constipation.

Perforation was noted in 3 cases. The operation, gastro-enterostomy, had not checked the penetrating tendency of the ulcerative process.

Hemorrhage occurred, as shown by vomiting of blood or undoubted evidences of blood in the stool, in 20 of 113 cases having more or less severe, late gastric symptoms following operation. In none of the cases was the bleeding fatal. In 12 out of 15 cases, such manifest hemorrhage had also occurred before operation. Out of the entire series in which the late results of operation were investigated, 7 per cent. had manifest hemorrhage, although a far greater per cent. suffered from recurrence of the ulcer.

The Prognostic Significance of Age. In the histories after gastric operations it appeared that younger individuals did not show as good late results as older individuals. The details of this are worth while repeating. In 33 women under thirty years who had undergone operation, 42 per cent. suffered from subsequent gastric symptoms; whereas, in 33 women over fifty years of age, only 24 per cent. had subsequent trouble; and lastly, out of 41 men over fifty, only 17 per cent. reported having subsequent untoward symptoms.

Peptic Gastrojejunal or Jejunal Ulcer. This complication of gastro-enterostomy was reviewed in PROGRESSIVE MEDICINE for June, 1911, p. 113. At that time 89 cases had been collected in the literature. Since then new cases have been added, so that at the present time Petrén has brought up the total to 112, this includes 6 cases of his own.

Of the patients with gastrojejunal or jejunal ulcer following gastro-enterostomy, 84 per cent. were men, especially those in young or middle life. The lack of a tendency to ulcer formation in later life may be possibly accounted for by the fact that acidity frequently diminishes with advancing age, in some cases to such an extent that achylia gastrica is present. In Petrén's series of gastro-enterostomized patients, out of 93 men, 5 subsequently developed peptic jejunal, or gastrojejunal ulcer; while of the 123 women, upon whom the same operation had been performed, not one developed this complication. From the above figures it was concluded that the danger of gastrojejunal ulcer after gastro-enterostomy is practically *nil* in women, but is about

5 per cent. in men, especially younger men. Recent experimental work on jejunal ulcer after gastro-enterostomy is reviewed elsewhere in this article.

The Development of Cancer upon Chronic Ulcer of the Stomach is an extremely important subject. Since attention was called to the great frequency of its occurrence by the Mayos, in 1909 (referred to in PROGRESSIVE MEDICINE for June, 1910, page 97), many recent reports of various authors state that a surprisingly large percentage of those cases in which resection was done for callous ulcer, revealed beginning carcinoma, in other words, the percentage of reported cases of carcinoma of the stomach developing in the margin of a callous ulcer is steadily increasing from year to year.

In this connection a most interesting series of 5 cases has been collected by Petrén. In these, gastro-enterostomy was performed for callous ulcer of the stomach. The patients remained apparently well for a number of years, after which they sickened and died of carcinoma of the stomach, as proved at operation or autopsy.

IN X-RAY EXAMINATION of 35 cases of gastro-enterostomy for ulcer, one to five years after operation, certain technical difficulties were present, because, where the gastro-enterostomy was situated near the pylorus, it was not always easy to determine whether any given bismuth shadow indicated the pyloric opening or the gastro-enteric stoma; and, where such a gastro-enterostomy lay higher up on the stomach wall above the greater curvature, the bismuth-filled stomach overshadowed the gastro-enterostomy and adjacent intestine.

It was found unsafe to draw conclusions from a single examination, for experience showed that the motor function of the stomach was subject to considerable variations from day to day.

Petrén found it surprising how these pictures varied, both as regarded peristalsis, and the mode of escape of contents from the stomach. Practically no two cases were identical. In 17 of the 35 cases, the stomach emptied itself entirely through the gastro-enterostomy opening; in 7 (possibly 12 cases), material passed through the pylorus as well as the gastro-enterostomy and, finally, in 5 cases—possibly 6—entirely through the pylorus.

Closer consideration of the 29 cases in which the gastro-enterostomy was found to functionate, showed the individual differences referred to above. In certain cases the bismuth began to leave the stomach as soon as material had been swallowed, and one obtained the impression that the gastric contents were flowing out of the stomach through a patulous opening simply by gravity alone.

Subjective Symptoms Compared with X-ray Findings. The majority of the 24 patients whose gastric mobility was found satisfactory, felt healthy and free from symptoms even when the stomach emptied itself so rapidly that it no longer functionated as a stomach. Among

the patients with inadequate gastric motility, some showed symptoms, and others were free from any trouble whatever. Does the size of the dilated stomach change after gastro-enterostomy? Petrén states that the dilatation of the stomach following ulcer, persisted for years after a well-functionating gastro-enterostomy had been established. (Schüller¹ reports that after gastro-enterostomy he has noted no change in the shape, size, or motility of the stomach.)

If the anastomosis be made near the pylorus, that is, in the antrum, it remains open longer than if made elsewhere (Petrén).

A distinction must be made between the function of an atonic stomach and of one in which the ability for concentric contraction has not been lost. In the former, it seems that where the gastro-enterostomy opening does not lie at the most dependent point upon the greater curvature, retention occurs with the patient in the upright position, and, that such retention is directly in proportion to the height of the stoma above this maximum low point. On the other hand, if the stomach has the power of concentric contraction, it can expel its contents through an opening which is not necessarily at the lowest point.

PROPHYLAXIS IN ULCER PATIENTS. *Gastric ulcer is only one symptom of gastric ulcer disease* (Schwarz).

In the literature one finds numerous examples where, in spite of resection or excision of the ulcer, after a longer or shorter time, new and undoubted ulcer symptoms occur, even in the form of perforation or acute hemorrhage with fatal results. One must bear in mind, although we can operate for ulcer, that we cannot remove by operation the individual disposition to ulcer formation.

During the last year a number of authors have laid great emphasis upon the fact that individuals cannot consider themselves entirely healthy after operations for ulcer, even though they are free from symptoms. This is of great practical importance. There is no doubt that many ulcer patients, in the pleasure of being able to eat and digest dishes which, for many years previously, they had been forced to deny themselves, and, in spite of their physician's warning or even definite dietetic instructions, frequently indulge in a diet which, both as to quality and quantity, is most unsuitable for people with disposition to ulcer. It is important that all these people, especially those of more youthful age, should permanently observe care in their diet; and if, notwithstanding this, gastric symptoms should make their appearance, such patients should promptly present themselves for examination and treatment.

Experimental Production of Jejunal Ulcer after Gastro-enterostomy. Escatto's² experiments on dogs are of interest. In seven dogs on whom

¹ Mitt. a. d. Grenzgeb. d. Med. u. Chir., Band xxii, Heft 5.

² Ibid., Band xxiii, Heft 1.

a posterior gastro-enterostomy (retrocolic) was done, no ulcer developed. In seven other dogs, a Y anastomosis, either with the anterior or posterior wall, was made; in six of these, jejunal ulcer developed. Often the ulcer was multiple. In these cases the pylorus was excluded so that the alkaline bile and pancreatic juice did not meet the acid chyme until the fork of the Y was reached.

Hartwell and Hoguet¹ confirmed Escatto's work in the course of an experimental investigation regarding intestinal obstruction. The jejunal ulcers were situated in a limb of the Y leading from the stomach before its union with the limb conveying bile and pancreatic juice.

Escatto reaches the conclusion that methods such as the Roux Y or Braun's entero-anastomosis should not be used, since they hinder the neutralization of the acid stomach juice by the alkaline bile and pancreatic juice, and, therefore, predispose to the formation of jejunal ulcer. Posterior gastro-enterostomy is the operation of choice because, not only do the alkaline bile and pancreatic juice meet the acid chyme at the anastomosis with the stomach and thereby insure a neutralization of jejunal contents, but the hyperacid gastric juice in the stomach itself is partially neutralized. This may account for the temporary improvement of subjective symptoms in non-pyloric gastric ulcer, following a gastro-enterostomy.

The presence of *bile in the stomach* has been held to be an undesirable condition. Probably cause and effect have been confused. The *obstruction* to further progress of contents into the small intestine has, as one of its signs, the presence of bile in the vomit. Bile itself in the stomach does no harm. Kehr² cites 50 cases of cholecystogastrostomy, all of which have done well. Further, in conditions of hyperacidity it may be noted, that certain patients are often relieved by vomiting, and that the relief comes as soon as a mouth full of bile-stained fluid appears.

Gastric Function after Circular Resection. Since circular resection of the stomach for ulcer is being performed with increasing frequency nowadays, and since this operation deprives that part of the stomach beyond the line of section of its vagus supply, Kirschner and Mangold³ determined to reproduce like conditions in dogs so as to ascertain whether the motility of the pyloric portion of the stomach was changed after loss of its vagus innervation. The details of their experiments need not be repeated here. They found, however, that both tone of the sphincter pylori, and the rhythmic rate of opening and closing of the pylorus while the stomach was emptying itself, remained perfectly normal; the same held for the rises in intragastric

¹ American Journal of the Medical Sciences, February, 1912.

² Discussion of Körte's paper on Acute Pancreatitis at Naturforscher versammlung, September, 1911.

³ Mitt. a. d. Grenzgeb. d. Med. u. Chir., Band xxiii, Heft 3.

pressure during the contraction of the antrum pylori, as well as for the rhythm and character of the antral contractions. The functional coördination of sphincter and antrum wall remained unchanged, likewise the reflex response of the pyloric portion of the stomach to chemical stimulation of the duodenal mucosa. Therefore, these experiments affirm the noteworthy fact, that in human beings, normal gastric function is regained soon after circular resection.

Results of Total Gastrectomy. Moynihan's¹ patient lived three years and eight months after complete gastrectomy for carcinoma. The man did well up to one year before death, when a severe anemia set in. The treatment instituted effected only transient improvement, after which there was a steady decline until death.

Postmortem revealed the absence of any local recurrence or metastatic growth. A few fibrous adhesions were present between the abdominal scar and the beginning of the jejunum. The lower end of the esophagus had been joined to a loop of jejunum which had been brought through the transverse mesocolon. At the site of anastomosis, and for a short distance beyond, the jejunum was dilated; the duodenum was not distended.

Sykwow² reported a case of a woman, aged fifty-three years, upon whom total gastrectomy for carcinoma had been performed. The duodenum was united to the esophagus with difficulty. Recovery. At the end of two and a half months there was a gain in weight of 8 kilograms. Intestinal function was normal; x-rays showed dilatation of the small intestine beyond the anastomosis.

Postoperative Hemorrhage from the Stomach. Winiwarter³ reports 30 cases of this condition occurring not only after laparotomy, but, after operations elsewhere, on the brain, hip-joint, etc. All these occurred within the first three days after operation. In severe cases, lavage with silver nitrate solution proved useful.

Thrombosis, retrograde embolism, the excretion by the stomach of toxic substances in the blood with injury to the mucous membrane, are among the theoretical causes advanced for this condition. This type of hemorrhage, and acute dilatation of the stomach, are poorly explained sequelæ of general anesthesia which continue to present an interesting field for investigation.

Combined Pyloric and Cardiac Stenosis. Moorhead's⁴ patient, aged twenty-nine years, was first operated on for perforation of a gastric ulcer in the pyloric region. The opening was closed by suture. Posterior gastro-enterostomy. Six months later symptoms of esophageal stenosis developed. Gastrostomy was followed by a fatal, septic, post-

¹ *Lancet*, August 12, 1911.

² After reference in *Zentralbl. f. Chir.*, 1911, p. 623 (original in Russian).

³ *Langenbeck's Archives*, Band xcv, Heft 1.

⁴ *Practitioner*, 1911, vol. lxxxvi, No. 6.

operative pneumonia. Autopsy: Benign stenosis of the esophagus due to ulcer; the gastro-enteric anastomosis, which was situated at a distance from the pyloric part of the stomach, was patent. There was an enormous hypertrophy of the pyloric part of the stomach which had not existed at the first operation.

In discussing the case, Moorhead stated that the relief which the patients experience after gastro-enterostomy for ulcer, is largely due to neutralization of the gastric contents by the alkaline intestinal juices.

Linitis Plastica is the subject of a comprehensive monograph by Lyle,¹ who says: "The term linitis plastica was used by Brinton to designate a special disease of the stomach, benign in nature, characterized pathologically, by a diffuse or circumscribed increase in the connective tissue, involving chiefly the submucosa, and to a lesser degree the other layers, thus giving rise to a marked thickening of the stomach walls with a corresponding diminution in its lumen; clinically, by its insidious onset, its slowly progressive gastric symptoms, cachexia, and fatal termination."

Two forms are recognized in the *pathology* of this condition, local and general. In the former, indurated plaques may be found in different portions of the viscus; this is rare. Oftener a plaque of varying extent is present in the pyloric region which encircles the pylorus, causing stenosis. There is sharp demarcation of this infiltration at the duodenum in contrast to its indefinite shading off into normal stomach-tissue elsewhere.

In the generalized type, the size of the stomach may be normal, enlarged, or contracted. In a typical case, we find a shrunken thick-walled tube, lying transversely across the epigastrium, suggesting, by its size, a segment of the large intestine.

Sclerotic plaques, similar to those in the stomach, are found in the colon, small intestines, and rectum in some cases. The microscopic examination shows a mucosa which may be normal or may be the seat of a chronic gastritis. Diffuse hypertrophy of the connective-tissue elements in the submucosa is the most characteristic and constant lesion. Epithelial cells are found in the submucosa and muscularis. Whether they are carcinomatous, or not, is a question.

Etiology. Disturbances of the vascular system, cardiac insufficiency, arteriosclerosis, etc., occur in a number of cases. Multiple peptic ulcers, tuberculosis, but not syphilis, have also been considered etiological factors. Occupation trauma was noted in several cases. "The ascites and peritonitis are results, not causes."

The *Symptoms* are not characteristic. At first there is an indefinite dyspepsia, gradually followed by more or less constant anorexia,

¹ Annals of Surgery, November, 1911, p. 625.

occasional vomiting, and indistinct gastric pain. Later on, there is constipation, with attacks of partial obstruction and then diarrhea (diarrhea is frequently present with achylia gastrica). Increase of hydrochloric acid is uncommon, decrease or absence of free hydrochloric acid is the rule. Vomiting, at first inconstant, becomes more frequent, and, finally, almost incessant. It depends more upon the quantity of food taken than upon its particular quality. Ascites and edema are usually terminal symptoms. If not relieved by surgical measures, the disease is uniformly fatal.

Diagnosis is rarely made during life, except at laparotomy. Even at operation, a gross differential diagnosis between linitis plastica and scirrhus cancer is impossible. Microscopic examination must give the decision.

Treatment. As to operation, gastrectomy is, if technically feasible, the operation of choice. When the condition of the patient, and the local findings contraindicate this, gastro-enterostomy is advisable.

Lyle was able to collect 71 cases of the disease, including one of his own; here, at a first operation, the condition was not recognized, but was thought to be a case of ulcer of the stomach with numerous perigastric adhesions accompanied by accidental rotation of the stomach. The walls of the stomach at that time were thickened and scarred. Freeing of the adhesions and shortening of the gastrohepatic ligament gave relief for almost a year. At the second operation "the uniform increase in thickness of the walls, and marked diminution in size of the stomach, plus the scarring, showed that something else than a contraction following simple ulcer had to be dealt with." In this case there were two factors, each of which had been given as a cause of the disease—there was a well-marked history of chronic passive hyperemia from cardiac insufficiency, the result of repeated attacks of rheumatism, and, a strong probability of multiple peptic ulcers.

An Accessory Stomach is a curiosity worthy of mention. Wendel, at the last German Surgical Congress, reported the case of a woman, aged thirty years, who presented the clinical picture of cholelithiasis and pyloric stenosis. At laparotomy, a cystic tumor the size of a small apple was found, with its upper pole adhering to the inferior margin of the pylorus; it hung downward, covered in front by the gastrocolic ligament and lying in contact with the pancreas behind. It had been palpable through the abdominal wall previous to operation. The tumor was removed without opening the stomach, a pyloroplasty was then made, stones in the gall-bladder were removed and the latter drained.

Microscopic examination proved the tumor, whose wall was about 6 mm. thick, to be an accessory stomach. The histological structure of the tumor wall was identical with that of a normal stomach. At the lower pole there was a small accessory pancreas, the duct of which communicated with the lumen of the tumor. There was no communi-

cation with either stomach or gut. In short, this tumor was a little accessory stomach with a pancreas of its own.

Retrograde Esophagoscopy. After establishing a gastric fistula, Ach¹ introduces an esophagoscope through it for the purpose of observation or manipulation in the region of the cardia and lower esophagus. He considers his method of especial value in the extraction of foreign bodies from the lower esophagus near the cardia. Such extraction should be followed by immediate inspection of the site of impaction with the same instrument.

Einhorn's Dilator consists of a long, narrow tube similar to a ureteral catheter. Surrounding the last one and a half to two inches of its lower end, is an inflatable rubber bag. After the tube's end lies in the duodenum, the bag is inflated and the pylorus is supposedly stretched by pulling the inflated bag through it. There are two principal objections to the claim that this device is really able to stretch the pylorus. First, it has been proved in urethral work more than twenty years ago, that the dilating power of an instrument like Einhorn's is determined by the diameter of its solid portion. The dilatable part expands proximally and distally to the stenosis, forming a dumb-bell shape. If the entire dilatable part of the instrument lies beyond the stricture and is pulled through it, the same principle holds true, namely, the air gradually enters the empty anterior part, which emerges to the proximal side of the stenosis, and the dumb-bell shape is again present. In other words, the instrument can be slowly pulled past the stenosis which it does not dilate to any extent. Second, when one remembers what relatively greater force is employed in Loretta's digital method of stretching the pylorus, and this without success, it is difficult to understand how a thin duodenal tube with a little light rubber bag which surely exerts but a fraction of such force, can accomplish more.

Exploratory Gastrotomy for Ulcer is described by Coffey.² Traction loops which pass through all coats of the stomach are pulled upon, raising the stomach, which is then opened transversely between them. In this way, spilling of gastric contents is prevented. The stomach is then emptied. If the ulcer is found posteriorly, the gastrocolic and gastrohepatic omenta are opened, and the lesser peritoneal cavity is packed to prevent soiling. The ulcer is trimmed out with scissors. If the anterior opening is inadequate, it may be continued posteriorly so that complete transverse division of the stomach is accomplished. Now both halves of the organ can be brought forward and their respective interiors examined. Individual circumstances will then

¹ Bruns' Beitr. z. klin. Chir., Band lxx, Heft 1.

² Journal of the American Medical Association, vol. lvii, No. 13, 1026.

determine the subsequent course of procedure (excision, circular resection, etc.).

A New Method for Uniting Stomach and Intestine after Resection According to Billroth II has been suggested by Pólya.¹ The uppermost jejunal

FIG. 31

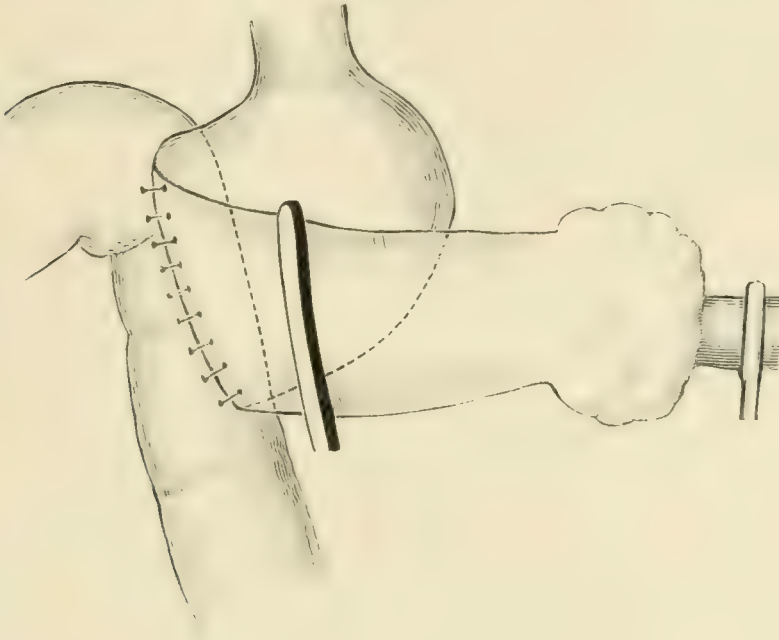


FIG. 32

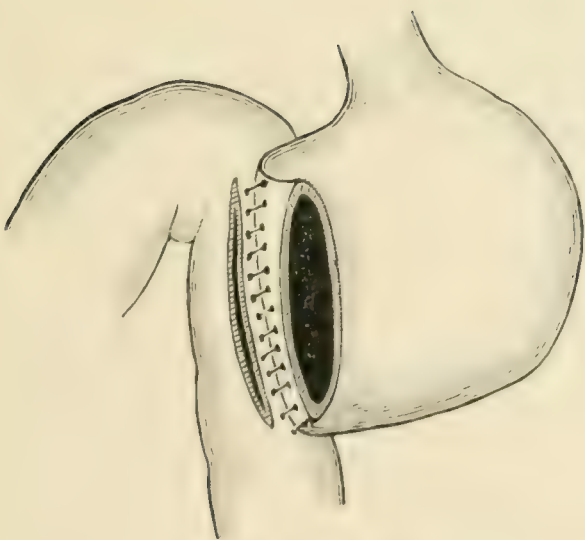
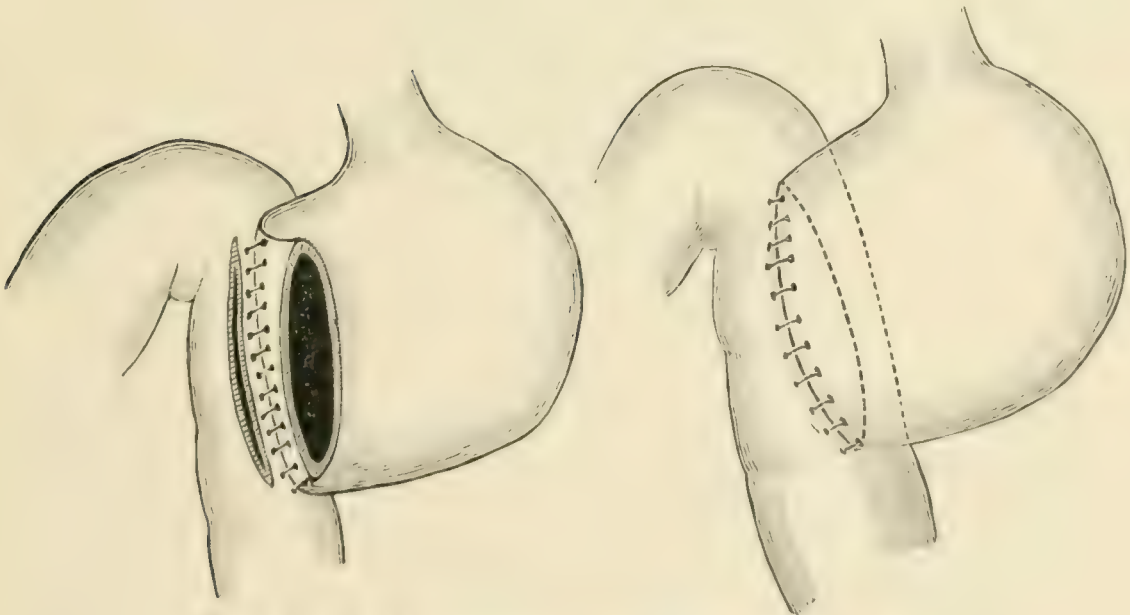


FIG. 33



FIGS. 31, 32, 33.—Pólya's modification of Billroth II.

loop is drawn through an opening in the transverse mesocolon and an end-to-side anastomosis is made with the entire lumen of the stomach, as shown in the accompanying illustrations (Figs. 31, 32, and 33).

¹ Zentrabl. f. Chir., 1911, No. 26, p. 892.

The procedure is simplified if the posterior serous suture between the jejunum and posterior stomach wall be made immediately after division of the duodenum and before complete amputation of that portion of the stomach which is to be resected (Fig. 31).

Pólya reports 6 cases of resection for carcinoma in which his method has been carried out. Two patients recovered fully; a third died of erysipelas five weeks after operation; 3 extremely cachectic patients died one or two days after operation. Autopsy showed perfect condition of the gastrojejunal anastomosis. In the 2 living patients, *x*-rays demonstrated that a bismuth meal left the stomach in a very short time.

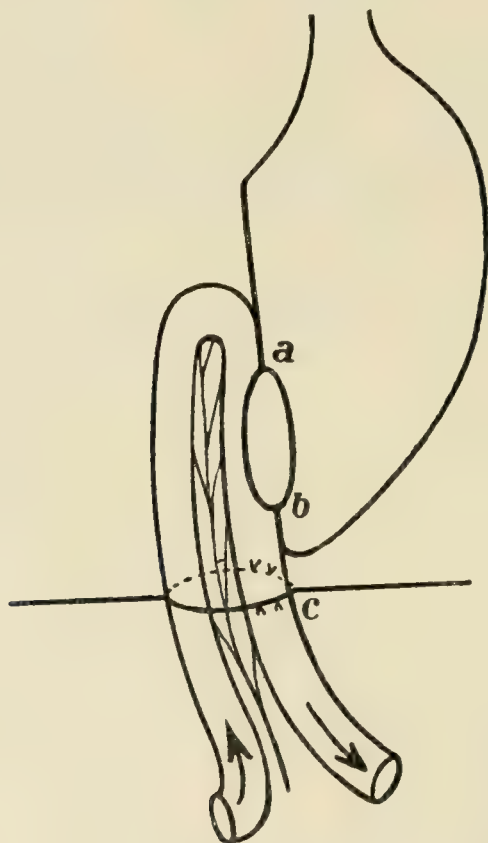


FIG. 34.—Wilms' variation of Pólya's procedure.

In spite of the advantages of his own procedure, Pólya uses Kocher's method when this is feasible, because, in performing it, the lower abdomen is not invaded, since all operative activity is confined to the region between the liver and transverse mesocolon.

Later, Wilms¹ announced that he had recently been using a method very similar to that of Pólya with this difference—the upper part of the resection wound in the stomach near the lesser curvature is closed, the jejunal loop is anastomosed to the lower part of the stomach which remains open (Fig. 34). The upper angle of the gastrojejunal suture point (*a*)—practically the weak point, which is most apt to

¹ Zentralbl. f. Chir., 1911, p. 1087.

leak in the Billroth I method—is buried by suturing the adjacent jejunum over it and for some distance upward, thereby additionally strengthening the suture line closing in the upper half of the stomach wound. The first few times he performed this operation, Wilms partially closed the lower angle of the stomach opening, as shown in his drawing (b). More recently he has omitted this, anastomosing stomach to jejunum from point (a) downward.

Wilms lays stress on carefully uniting the jejunal loop to the transverse mesocolon in order to prevent peristalsis from causing more of the small intestine to enter the lesser peritoneal cavity with the accompanying danger of ileus. Wilms reports using this method with success in seven cases.

Reichel¹ complained that he had been ignored by Wilms and Pólya, and that his report of a similar method at the German Surgical Congress, in 1908, has not been noticed by these authors. This omission was probably due to the fact that Reichel's report was made in the course of a general discussion dealing with aseptic operations upon the stomach and intestine, and that he had not taken the pains to publish his experience elsewhere.

Treatment of the Duodenal Stump in Resection of the Stomach According to Billroth II is a most important factor in obtaining successful results with this method. Leakage at the duodenal stump has been one of the chief objections to the Billroth II operation. Ali Krogius described an excellent method for preventing this in the *Zentralblatt für Chirurgie* on September 28, 1907 (page 1138). Apparently this was not observed by Schwarz² and Faykiss,³ who recently described practically the same technique. Krogius states, in his original communication, that in extensive resection of the pylorus for carcinoma, it is frequently necessary to divide the duodenum so far down, that the remaining stump does not furnish sufficient material for proper invagination. It is necessary, in such cases, to mobilize the second portion of the duodenum by dividing its retroperitoneal attachment, thereby gaining a surface devoid of peritoneum on its posterior aspect. Here the intestinal wall is thin and friable, and consequently does not hold sutures.

Under such circumstances, Krogius advises to free the duodenum from its surroundings, including the head of the pancreas. Now, at a point sufficiently distant from the pylorus, the gut is either crushed and ligated, or is simply divided and its end closed by suture. After this, that part of the duodenum which is devoid of peritoneum is depressed into the intestinal lumen and buried by a continuous Lembert suture which unites the adjacent margins of the peritoneal defect. (Figs. 35 and 36 illustrate this.)

¹ *Zentralbl. f. Chir.*, 1911, p. 1401.

² *Ibid.*, 1912, p. 1402.

³ *Ibid.*, 1911, p. 1532.

In a very recent note, Krogius reports continued success with his method and agrees with Schwarz regarding the security against leakage afforded by it.

Recently Proposed Methods of Pyloric Exclusion. Girard¹ performs pyloric exclusion by transversely incising the serosa and muscularis down to the mucosa. The wound thus made is closed longitudinally—in effect a reverse of the Mikulicz-Heinecke pyloroplasty.

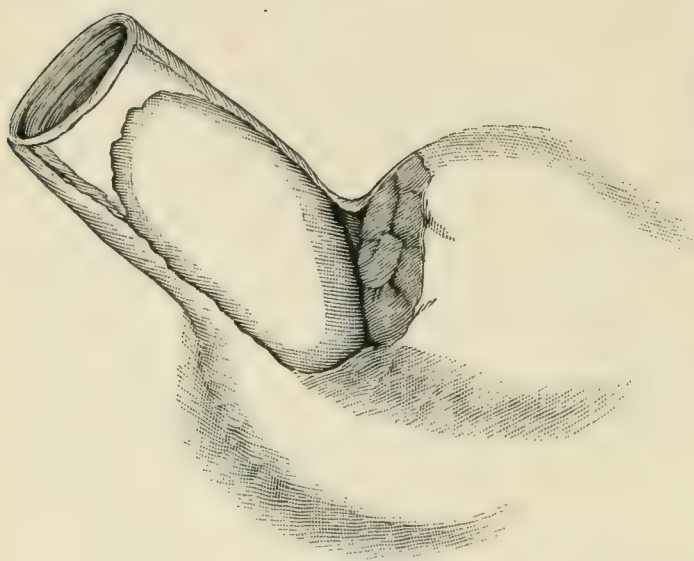


FIG. 35.—Duodenum freed, showing surface devoid of peritoneum. (Krogius.)

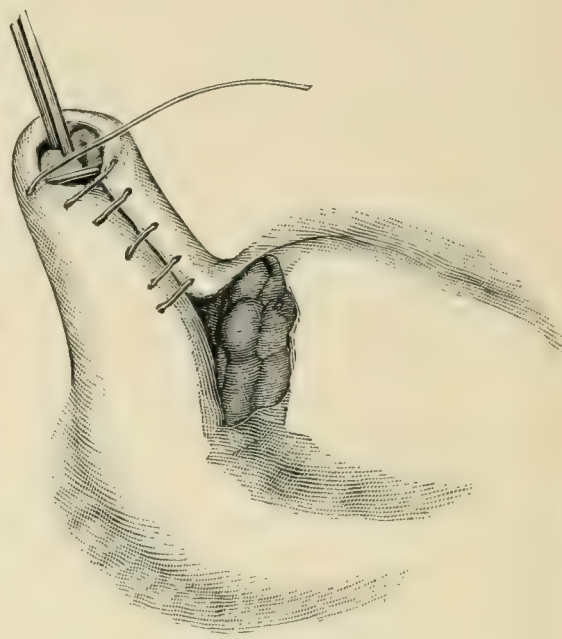


FIG. 36.—Raw surface buried. (Krogius.)

PYLORIC EXCLUSION BY MEANS OF A FASCIAL SLIP is employed by Wilms,² who encircles the pylorus with a strip of fascia obtained from the anterior sheath of the rectus. This is either knotted or fastened in place by suture. It was employed in two cases. Subsequent *x*-ray showed that nothing passed by way of the narrowed pylorus. Wilms believes that the method of exclusion where the stomach is divided and both ends closed by suture, is followed by atony of the excluded pyloric portion. Whether such atony follows constriction by the fascial strip, remains to be seen.

THE INTESTINES

A Continuous Inverting Stitch for Closing the Anterior Mucous Suture Line in Entero-anastomosis is clearly shown by the accompanying illustration (Fig. 36). It was proposed by Schmieden,³ of Bier's clinic.

¹ German Surgical Congress, April, 1911.

² Deut. med. Woch., January 18, 1912, p. 101.

³ Zentralbl. f. Chir., 1911, p. 531.

The needle is passed from the mucosa to the serosa each time. Upon pulling the suture tight, the mucosa is everted, and the serosa is inverted. An exact approximation of layers is not effected. A better method of closing the anterior half of the entero-anastomosis than the Connell's through-and-through continuous mattress suture followed by the Cushing parallel stitch, is yet to be invented.

"The New Method of Treating Denuded Bowel Surfaces" proposed by Richardson¹ is explained by the accompanying illustrations (Figs. 38, 39, and 40). The condition produced by this method strongly resembles an artificially made Lane's ileal kink, pictures of which before (Fig. 41) and after (Fig. 42) separation, are introduced for the sake of comparison. Time alone will show whether such a plastic with normal tissue will not lead to a kinking and its attendant troubles.

Volvulus following an Entero-anastomosis, which had been performed two and a half years previously, is reported by Boeckle.² An acute intestinal obstruction furnished indication for the second operation. At laparotomy, a conglomeration of loops of small intestine was found wrapped around a strand 15 cm. long. This strand proved to be the greatly lengthened connection between the two loops of large intestine which had been anastomosed at the first operation.

In the discussion of this case, Lejars remarked that such long-drawn-out, narrow communications have been observed to follow enterostomies as well as entero-anastomoses, and he cited a case in which, following colostomy, a narrow channel, 8 cm. long led from the intestinal lumen to the surface of the body. Not only have cases been observed in which entero-anastomoses stretched and thinned out, but at least one case of complete separation of the joined hollow organs has come to my knowledge. Here gastro-enterostomy with the Murphy button had been done a number of years previously by Lange, and a second laparotomy revealed absolutely no communication between the stomach and jejunum.

The Inter-relationship that Varying Degrees of Fulness of the Stomach and Colon have upon the Form and Position of Each Other has been studied by the radiologists Groedel and Schenck.³ They found that the position of the stomach changed according to the degree of fulness of the large intestine, and that, *vice versa*, varying degrees of fulness of the stomach affected the site of the large intestine. Naturally, the transverse colon roughly corresponds to the greater curvature of the stomach. In gastropptosis, ptosis of the transverse colon was invariably present. At times, the colon was more ptosed than the stomach. The physiological changes in position demonstrated by this study should be known, to prevent their being mistaken for pathological conditions.

¹ Annals of Surgery, December, 1911.

² Bull. et. mém. de la Soc. de Chir. de Paris, May 19, 1911, T. xxxvii, No. 17.

³ Münch. med. Woch., 1911, p. 2539.

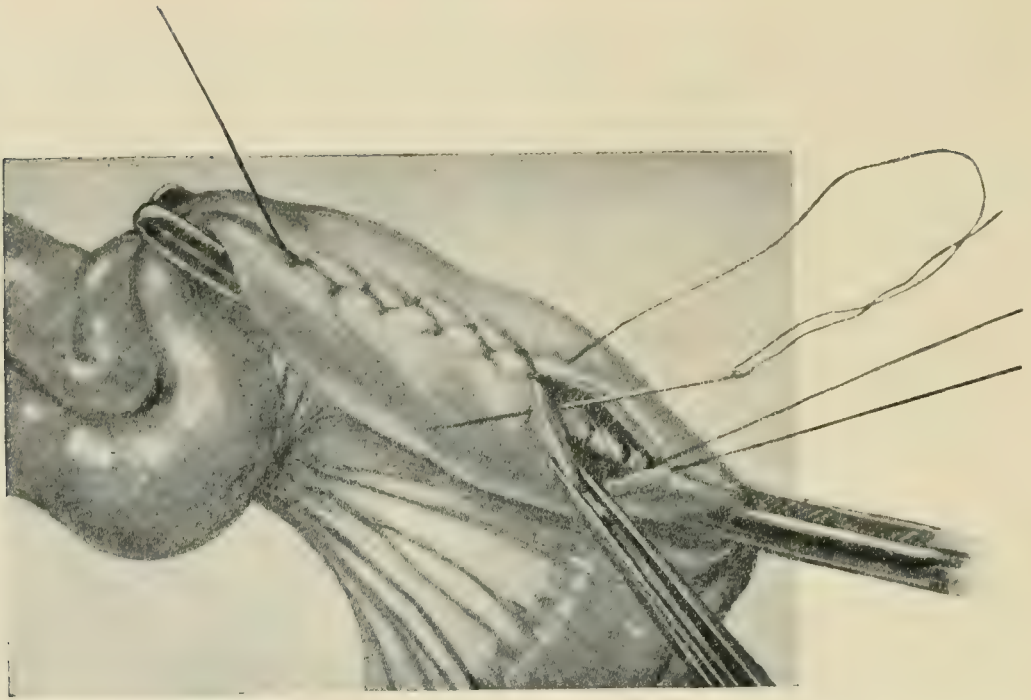


FIG. 37.—Schmieden's stitch for closing the anterior suture line of an anastomosis.



FIG. 38.—An extensive denuded area on the surface of the ileum is here shown. Observe that at its widest portion, *a-b*, it involves nearly half the circumference of the bowel. The liberal deposit of fat in the mesentery here represented admits of the ready separation of its two peritoneal leaves. Note that the incision for this purpose through the upper leaf is made about 1 cm. from its bowel attachment, in order to avoid the numerous branching vessels in this region. The separation of the flap *d* is now easily and safely effected to any desired extent, since the average width of the mesentery is eight inches. A flat, blunt instrument—a spatula, for example—is best suited for this step. The rich vascular anastomosis between the mesenteric leaves, afforded by the superimposed colonnade arrangement of the trunk vessels, is easily seen. (Richardson.)

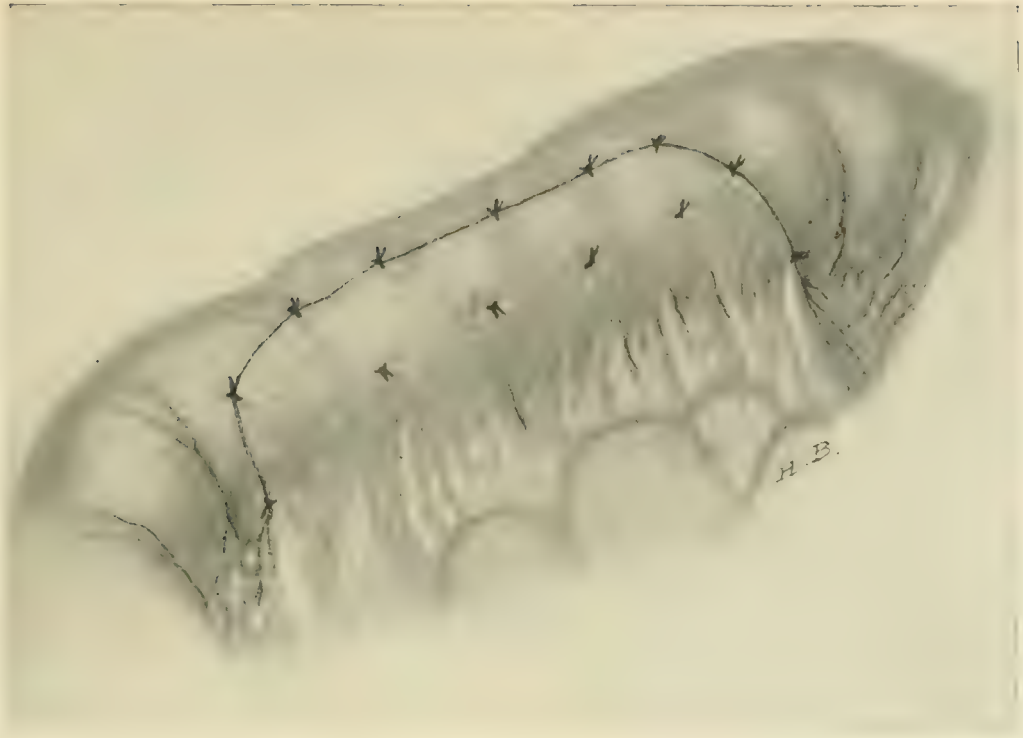


FIG. 39.—The detached flap of peritoneum is here shown drawn up over the raw bowel surface and firmly fixed by interrupted sutures of fine silk. Note how completely and satisfactorily the defect has been remedied. Observe too, that, owing to the mobility of both the bowel and its mesentery, the mechanical effect on the bowel lumen and the mesenteric circulation is negligible and cannot produce any serious consequences. Care must be taken to close the angles of the mesenteric flap just at the bowel margin as shown, to avoid the possibility of an intramesenteric hernia. (Richardson.)

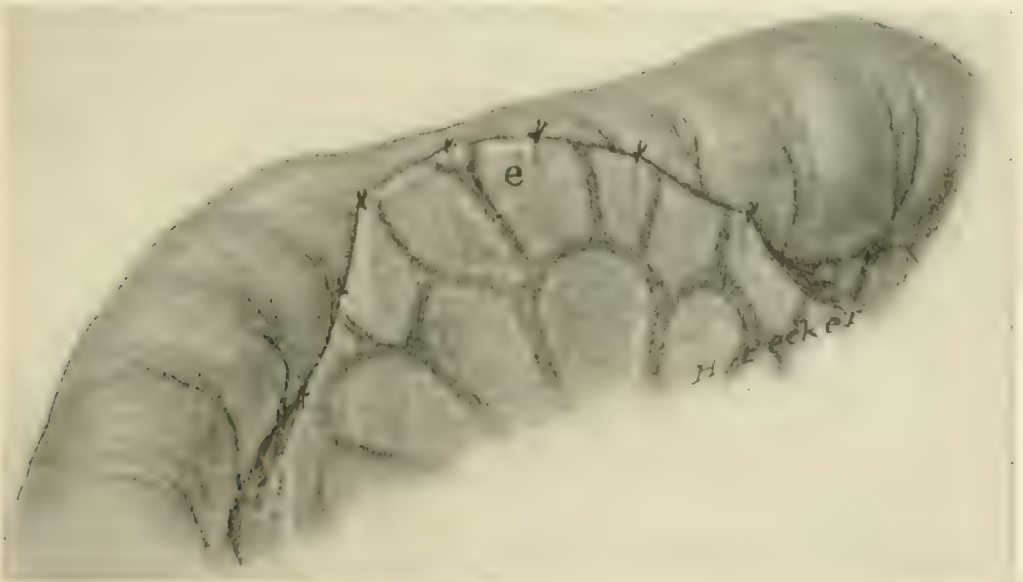


FIG. 40.—The plication modification of the method is here shown. Owing to an almost total absence of fat between the peritoneal leaves of the mesentery in some cases, it is unsafe and impracticable to attempt their separation. In such cases neither leaf is incised or separated from its bowel attachment, but both leaves are grasped together at the proper distance from the bowel border, lifted over the raw surface, and fixed by silk sutures. It amounts to a plication of the mesentery or a partial envelopment of the bowel within both layers of its mesentery. Note that care has been taken to place the sutures between the vascular trunks. This simple modification renders the method applicable to all cases, is even more quickly executed, and is eminently safe and satisfactory. (Richardson.)

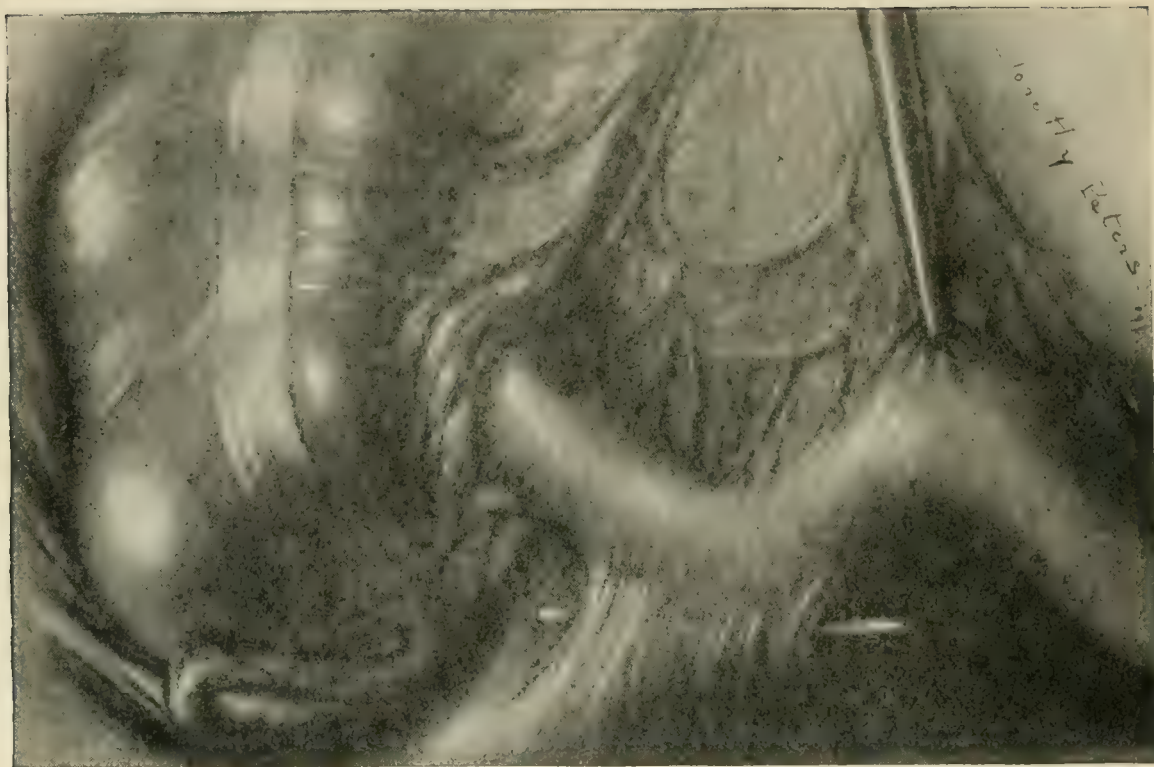


FIG. 41.—A form of Lane kink with adhesions. (Mayo.)

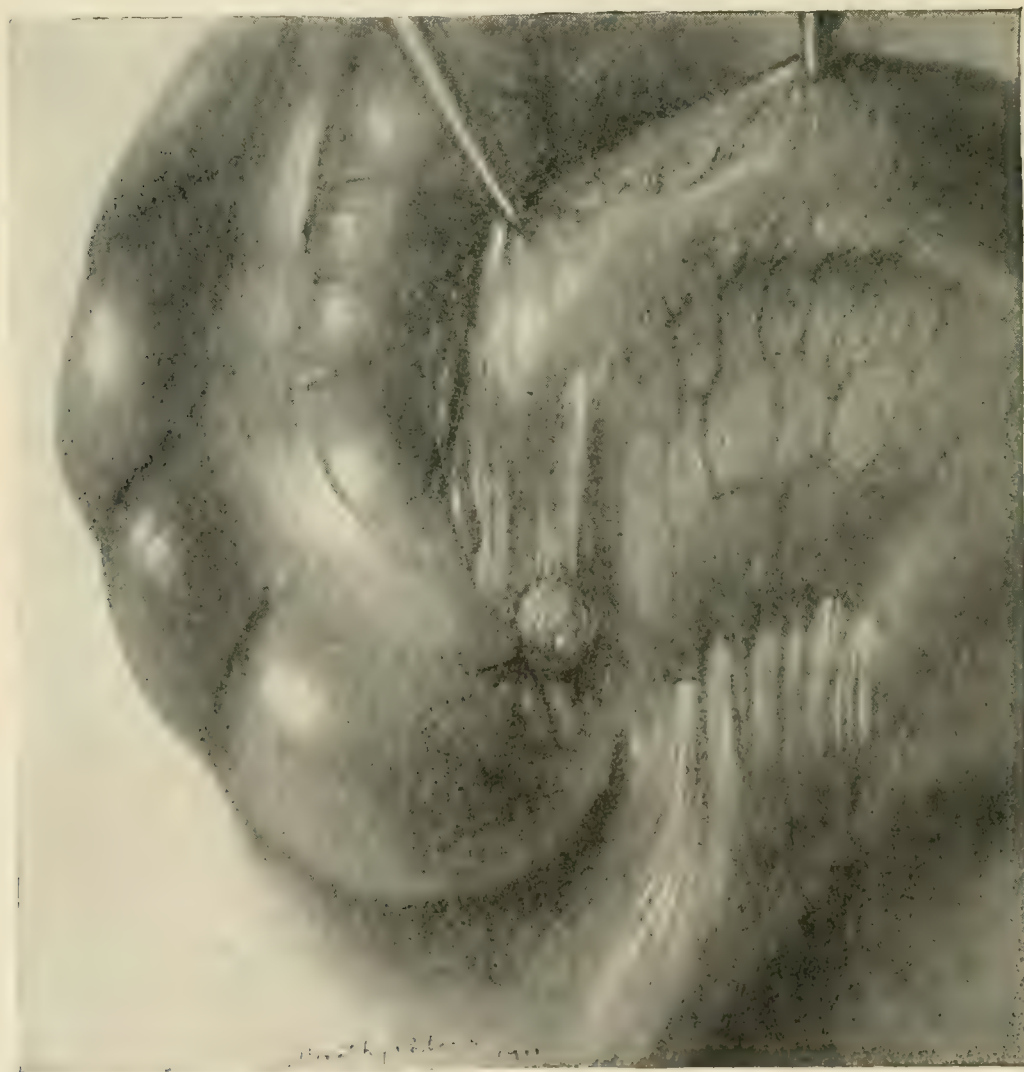


FIG. 42.—Lane kink after separation of the band and removal of the appendix. (Mayo.)

Filling of the colon raises the stomach, and filling of the stomach depresses the colon.

"The peristaltic action of the gut largely depends upon the peristaltic action of the stomach. If the latter is impaired, the former follows suit (Jonas¹)."

Cecum Mobile, Intestinal Stasis, Pericolitis, etc., were spoken of in PROGRESSIVE MEDICINE last year. Since then much additional matter has appeared in the literature. It seems as though the authors of various articles dealing with cecum mobile, intestinal stasis, pericolitis, etc., have more or less completely described the same condition, the nomenclature depending upon which part of this complex appeared most prominent to the individual observer.

Stierlin,² formerly Wilms', and now de Quervain's, assistant, has recently contributed a most comprehensive article on stagnation in the colon. His literary references are more complete than those of any other article. After a short historical review, he briefly makes mention of the proctogenous constipation in which intestinal contents travel down without delay to the lowermost portion of the large intestine and stagnate there. For this condition, Martin, Gant, and recently Goebell, have divided what they consider to be an excessively developed Houston's valve. This "valvidotomy" has met with but partial success.

Next, spur formation at the different flexures, especially the hepatic and splenic, is dealt with. In France, the authors who have busied themselves most with this aspect of the subject are Quenu, Rey, Nier, Berard, Patel, and Ducatte. In Germany, Roith³ and Payr have both made important contributions. The former of these, as far back as 1903, called attention to the fact that, normally, the colon proximal to the splenic flexure contained relatively more material than that distal to it. These conclusions were reached after a series of investigations upon the cadaver. More recently⁴ these findings have been substantiated by him upon the living by means of the *x*-rays, and both Bloch and Stierlin have confirmed them by the same means. The gut segment comprising cecum and ascending colon (and perhaps the transverse colon), resembles a stomach. This is the case both as regards form—being wider and having less marked indentations than the rest of the colon; and as regards function—*remaining* filled, while other portions of the colon become successively filled. In other words, as in the stomach, material at the distal end is extruded in small quantities at a time. Antiperistalsis plays an important part here. An exaggeration

¹ Wien. klin. Woch., 1911, No. 22.

² Mitt. a. d. Grenzgeb. d. Med. u. Chir., Band xxiii, Heft 3.

³ Anat. Hefte, 1903, Band xx.

⁴ Mitt. a. d. Grenzgeb. d. Med. u. Chir., 1909, Band xix.

of this physiological condition (normal sojourn of material for a while in the cecum), is found in certain cases of constipation. This undue stagnation in the ascending colon is becoming more and more recognized (as distinct from the proctogenous type of constipation referred to above). To this type of obstipation belongs Wilms' cecum mobile, *i. e.*, a distended, atonic, movable cecum with pains in the right iliac fossa and constipation. At times, but not always, the cecum mobile forms part of a general enteroptosis. On the other hand, stagnation in the ascending colon may occur with no dilatation or mobility of the cecum. In some of these cases there is a kink at the hepatic flexure, the limbs of which run parallel for some distance, while the flexure itself is freely movable.

Stierlin obtained the impression that, in some instances, stagnation was due to a purely functional disturbance. He conceded, however, that spasmodic contractions seen to occur at the hepatic flexure under the *x*-rays, might be due to interference with peristalsis by bands along the ascending colon.

ACUTE PRIMARY TYPHLITIS, in some instances, may prove to be an acute exacerbation of the same less marked process described as cecum mobile, etc.

Herhold¹ reported a case of peritonitis following acute typhlitis. In spite of laparotomy and drainage, the patient died. In the second case, the acute inflammation was considered as secondary to stasis. Laparotomy was followed by recovery. In both instances, the appendix was normal.

Pallin,² in an article entitled "Typhlitis and Ascendens Colitis," stated that cases of this condition may be divided into two classes: one, in old people who have suffered from constipation, in whom, at autopsy, masses of feces in the cecum are found (typhlitis stercoralis); another group consists of young people with acute affection of the cecum and ascending colon. Pallin cited no cases illustrating the first group. Two interesting cases of typhlitis were mentioned in children, aged eleven and fifteen years respectively, in one of whom acute appendicitis was also present, although the lesions of the large gut and of the appendix were a considerable distance apart. Another case was that of a young woman, aged twenty-seven years, whose appendix was found normal. On account of the edematous, thickened wall of the cecum, an ileo-transversostomy was done. Recovery.

The facts brought to light about so-called cecum mobile and its treatment at the German Surgical Congress (April, 1911), and the discussion of this whole subject at that time certainly deserve mention.

Wilms, the originator of the term "Cecum Mobile," stated that, in

¹ Deut. med. Woch., 1911, No. 4.

² Beitr. z. klin. Chir., Band lxxi, Heft 2.

considering this condition together with chronic appendicitis, certain distinctions must be drawn. The attacks of pain in so-called chronic appendicitis are due to (1) adhesions in the region of the appendix, cecum, and ascending colon, which are pulled upon when the gut fills up; (2) kinks or torsion of the cecum or hepatic flexure leading to transient obstruction.

Wilms said that the entity of *spasm of a movable cecum*, which others have termed typhlatony or typhlectasy, has nothing to do with the above conditions, but is regularly due to long stagnation of intestinal contents in the cecum. (In the subsequent discussion, he stated that he had in mind only such cases in which an acute attack had never occurred.)

The chief symptom of this condition was habitual, obstinate constipation. The long duration of intestinal contents in the cecum (as proved by x-rays) was due to the antiperistalsis of the ascending colon, which, together with spastic contractions of the cecum invoked by inflammatory irritation, accounted for the pain. These spastic contractions, which go together with a lengthening of the cecum, caused a tugging on its mesocecum, or, if the appendix and its mesenterolum were relatively short, a tugging of the cecum on them.

Cecopexy does away with the pains and with the chronic constipation in 75 per cent. of the cases. However, if an unusually large cecum be found, it is side-tracked by making an ileotransversostomy. Operation is indicated only after all medical treatment has failed.

Sonnenburg, in discussing Wilms' paper, gives that author all due credit for having called attention to this condition, but does not agree with him either as regards his interpretation of it, or his method of treatment. Sonnenburg maintains that a mobile cecum is of common occurrence; *per se*, it is nothing pathological; its mode of attachment varies greatly. The x-rays findings are unreliable because the shape, situation, and duration of the bismuth mass in the cecum, is greatly influenced by the sort of meals taken after the bismuth mixture has been drunk. Accumulation of material in the cecum is, in itself, nothing pathological. The conditions described as characteristic by Wilms are to be found in both healthy and constipated individuals. In the investigation of this question, the quality and quantity of nourishment must be considered, in order to avoid confusing physiological with pathological conditions.

Sonnenburg continued by saying that a mobile cecum first gives rise to symptoms when it becomes the seat of a catarrhal inflammation. Occasionally such a typhlocolitis is operated upon as an appendicitis. On the other hand, the majority of cases of chronic appendicitis operated on, are cured by appendectomy. . . . Typhlocolitis is usually only part of a general catarrh of the large intestine, and the prominence of such a typhlocolitis is due to *obstruction at the hepatic flexure*, therefore, we have no right to call cecum mobile and its accompanying symptoms a clinical entity.

Klose, of Frankfort, conceded that inflammation along the ascending colon and habitual torsion of the hepatic flexure, as well as an "habitual torsion of a mobile cecum," may be the true causative factors of symptoms ascribed to cecum mobile. The adhesions, hypertrophy, and atrophy of the cecal and colonic walls are secondary to this. The entire subject borders on visceroptosis, either congenital or acquired, and the question of fixation of displaced organs in their proper places.

Klose advised fixation of the displaced cecum, and states that since 1904, in a series of 154 cases, he has had 89 per cent. of absolute cures with this treatment.

Dreyer, of Breslau, raised the question, "Is a movable cecum a pathological condition?" This he answered by stating that, in an examination of 105 cadavers, he found a movable cecum in 67 per cent. In short, this condition is of such frequent occurrence that it can hardly be called pathological. A further question was raised, "Does Wilms' cecopexy (burying cecum retroperitoneally through a slit in the posterior parietal peritoneum) establish a physiological condition?" Regarding this, Dreyer remarked upon the greater frequency of a mobile cecum in women, and stated that the cecum is normally displaced upward during the later months of pregnancy. He argues that, if the cecum be fixed as in Wilms' operation, during the last months of pregnancy the ileocecal junction might form the summit of a loop whose afferent and efferent parts would lie parallel, and therefore tend to evoke intestinal obstruction. As substantiating the first part of these remarks, Dreyer states that 75 per cent. of Wilms' 52 cases were females, and that in his own series of 105 cadavers, 52 were females, and in only 11 (21 per cent.) of these was there no movable cecum.

Fromme agreed with Dreyer regarding the danger of intestinal obstruction in pregnancy due to a previous anchoring of the cecum, adding that although a mobile cecum was desirable, a too freely movable cecum predisposed to its volvulus, and indeed a number of such cases of volvulus of the cecum in advanced pregnancy have been reported.

Körte stated that, in the great majority of instances, adhesions found around the appendix and cecum originate from a previous attack of appendicitis. Distinct from the cases of chronic appendicitis are those with pains in the right iliac fossa and severe obstinate constipation. Körte was very skeptical as to whether a cecopexy will do such cases much good, for the fixation increases the work of the intestine. Like Sonnenburg, he remarked that an *x*-ray finding showing that bismuth remains in one spot for a longer time than usual, does not afford definite proof of an organic obstruction in that region. In two instances in which the röntgenologists made such a diagnosis, the subsequent operation revealed nothing pathological. Körte closed by saying that the fixation of a small portion of the large intestine will not cure a faulty

function of the rest of it. In any case to obtain reliable knowledge, we must wait for the late results of cecal fixation.

Sprenkel opposed fixation of a mobile cecum saying that the more mobile an intestine is, the more quickly can it propel its contents, and the more the intestine is fixed, the more stagnation of contents takes place. Therefore, a mobile cecum can contract more easily than a fixed one (provided no obstruction exists beyond it).

As regards the treatment of constipation due to stagnation in the ascending colon, the following varied opinions were given: Goebell and Voelcker both reef the atonic cecum. A distinctly backward step. Years ago this was done in the case of the stomach, but nowadays no one reefs the stomach wall because that organ is atonic.

De Quervain stated that, although heretofore surgical procedures have not been very successful in alleviating functional disturbances of the large intestine, nevertheless those to whom internal treatment has failed to give relief, often seek surgical aid of their own accord on account of the misery they suffer. As regards surgical treatment, temporary fistulæ have but transient effect, while permanent fistulæ make invalids of the patients. Therefore, intestinal exclusion is most practical. Animal experiment has shown that exclusion of the large intestine kills certain herbivorous creatures, that, however, dogs stand it relatively well, provided the large gut remains *in situ* above the point of implantation of the small intestine. If, however, this portion of the large gut be removed, the dogs usually die. The disadvantage of ileosigmoidostomy as seen in two patients of de Quervain, is twofold. (1) A retrograde transport (antiperistalsis) causes the intestinal contents to recede into the cecum. (2) Attacks of diarrhea frequently follow errors in diet or psychic irritation. Because of these, de Quervain recommends ileotransversostomy, together with extirpation of the ascending colon up to the hepatic flexure.¹

Other authors also cited cases showing that simple implantation of the ileum into the more distal portions of the large intestine merely converts all of the (excluded) colon on the oral side of the implantation into a huge long cecum. Riedel reported the case of a patient on whom a previous operator had done a side-to-side ileosigmoidostomy for dysenteric hemorrhages. The bleeding continuing, the ileum was divided beyond the anastomosis. Apparent recovery lasted for one year, when gradual abdominal distention set in. The patient then came to Riedel and laparotomy by him showed that, instead of passing from the anastomosis at the sigmoid downward to the rectum, the material

¹ In his earlier cases, de Quervain reefed the ascending colon, according to Stierlin (Mitt. a. d. Grenzgeb. d. Med. u. Chir., Band xxiii, Heft. 3), and increased the angulation of the hepatic flexure by suture to prevent return flow of intestinal contents into the cecum. More recently he has extirpated the cecum and ascending colon, and implanted the ileum into the transverse colon.

had gathered in the cecum where a huge fecal mass lay. The rest of the history was a recital of various attempts to repair damage already caused, including attempts to reestablish normal conditions, with but indifferent success. This patient submitted to nine laparotomies in all.

Körte cited two instructive cases. In the first, an ileotransversostomy was made because of a persistent cecal fistula following an appendicular abscess; the fecal fistula continued to discharge. At a second operation the large intestine was excluded up to the ileotransversostomy, and now only mucus came from the cecal fistula. At a third, and final operation, the excluded part of the colon was removed, and the patient was cured. In another case, ileosigmoidostomy was done. Here, the colon had to be extirpated up to the point of implantation in order to effect a cure.

No less an authority than von Eiselberg had observed ileosigmoidostomy to be frequently followed by persistent, troublesome diarrhea.

The fact that implantation of the ileum into the transverse colon or sigmoid may be followed by retrograde fecal transportation was well shown in three cases of Nicolaysen, of Christiana, at the Northern Surgical Association's meeting in Stockholm, August, 1911. Of these three patients, the first had undergone cecopexy four weeks previous to the operation done by Nicolaysen. The cecopexy had done no good. In the first two cases, ileotransversostomy was followed by much subjective improvement, including a regular, daily stool. However, *x*-rays showed constant stagnation in the cecum and ascending colon. In the third case, in which reefing of the cecum and ascending colon was done, (as in de Quervain's earlier cases) stagnation was demonstrated in the small portion of the transverse colon; that was on the distal side of the anastomosis. Nicolaysen concluded, therefore, that reefing (plication) must be carried up to the point of implantation of the ileum. If extirpation be substituted for plication, the procedure should include all gut up to the site of the anastomosis.

Foote's quotation of Hartmann from his article in *PROGRESSIVE MEDICINE* of 1909 (page 118), is worth repeating here, namely: "A permanent diarrhea will follow ileosigmoidostomy until the fluid fecal matter which flows from the ileum, after passing into the large bowel, has a back flow into the colon." Hartmann cited a case of unilateral exclusion of the large intestine where an opening in the ascending colon continued to discharge *formed* fecal matter, while fluid feces came through the normal anus, thus proving the passage of the fecal stream backward through the colon.

Intestinal Stasis. In England, as is well known, Arbuthnot Lane is the foremost champion of the operative treatment of "Chronic Intestinal Stasis." His view of the subject¹ is far more comprehensive

¹ *British Medical Journal*, April 22, 1911, vol. i, p. 913.

than that of any continental author, for not only are the points of partial obstruction in the colon dealt with, but also kinking at the pylorus (first part of the duodenum), at the duodenojejunal junction, and at the terminal part of the ileum close to the cecum. Lane's observations are correct, and he deserves due credit for having called attention to the existence of bands causing partial obstruction at different points along the digestive tube; but, his explanation of the formation of these bands, viewed from the standpoint of the pathologist, is rather strange.

Chapple,¹ Lane's assistant, confines himself to stasis in the colon as observed and treated by his chief. He states that there is a constant set of symptoms due to "a condition of chronic delay in the passage of the intestinal contents, which delay is mainly in the colon; secondly, that this delay is due to the mechanical obstruction caused by evolutionary adhesions, and results in an absorption of an amount of toxic material greater than can be efficiently dealt with by the individual." He goes on to say that, "based on this hypothesis and having found that the mere breaking down of such adhesions was futile, owing to their rapid re-formation, the lower end of the ileum was divided, and an end-to-side anastomosis was made between this divided end and the upper part of the rectum. Should pain have been a sufficiently prominent feature, the colon is removed to the site of the anastomosis at the same operation if the condition of the patient is sufficiently satisfactory, or, if not, at a subsequent operation, should this be necessary." Chapple describes the *symptoms* somewhat as follows: Abdominal pain was the chief complaint of the patients, constipation, though present, was disregarded by them. "The degree of this pain varied considerably in the different patients, but, in almost every case, was sufficient to make the sufferer lead the life of a chronic invalid, and, in a large number of the cases, had brought about a condition of total inability to perform the duties of life. The site of the pain varied, too, and its position was usually indicated by a hand placed on either side of the abdomen, and in those patients whom I subsequently saw operated on, this was a very fair guide to the main site of obstruction."

Auto-intoxication due to intestinal stasis was held responsible for the following list of symptoms: Headaches, attacks of nausea, loss of appetite, loss of weight, markedly cold hands and feet, mental apathy, a constant foul taste in the mouth, attacks of abdominal distention, general muscular pain, a sallow, brownish-skin staining, together with cystic degeneration of the breasts. (It is conceded that many of these symptoms are seen in obstinately constipated people, but the changes in the breasts ascribed to this condition seem a little far-fetched.) As regards other points in the physical examination, nothing new was brought out. It was stated that, in all these cases, previous treat-

¹ British Medical Journal, April 22, 1911, vol. i, p. 915.

ment had been long and varied; "it had been largely medical, and, carried out in the ablest hands, had failed. Toward the abdominal pain, surgical treatment has been directed in several cases and such operations as appendicectomy, nephrorrhaphy, ventrofixation of the uterus, and removal of the coccyx has been performed." For fear of misquoting, we give Chapple's exact words regarding Lane's operation:

"The abdomen is opened by an incision through the left rectus, and the viscera are examined. The lowest point of obstruction is found, and the ileum is divided and its distal end invaginated by a purse-string suture, and then the proximal end of the ileum is implanted laterally into the lowest accessible portion of the iliopelvic colon. It may be mentioned that quite frequently the iliac colon is so tightly adherent, and the wall of the intestine so thin, that this end-to-side anastomosis is a difficult procedure. A full-sized esophageal tube is introduced through the anus up through the anastomosis, and is fixed in position by a suture through the perineum, and is retained for four or five days.

"Should the pain have been a sufficiently prominent feature, it is considered wise to remove the colon up to the seat of anastomosis by ligaturing the mesocolon in portions, and then dividing it beyond the ligatures."

As regards the causes of obstruction, Chapple says "it is due, in the majority of instances, to the presence of adhesions which fasten the bowel to the posterior abdominal wall in such a way that the bowel is kinked upon itself at an acute angle, and often, in addition, is rotated on its longitudinal axis. Thus a very definite cause of partial obstruction is produced." Note how closely this resembles the partial torsion of the mobile cecum and hepatic flexure described by certain German authors. As said before, it is not the facts observed, but their explanation, with which we cannot wholly agree.

POSTOPERATIVE COURSE. Here the list of symptoms "due to auto-intoxication" are again gone over and their partial or entire disappearance noted. Considering the experience of other reliable authors with ileosigmoidostomy, namely, that the operation is frequently followed by troublesome diarrheas, we are surprised to read Chapple's words: "there has not yet been, to my knowledge, a case of diarrhea following the operation."

Freedom from pain and constipation does not seem to have regularly followed ileosigmoidostomy, with or without colectomy. When pain persisted, Chapple ascribed it to one of three causes:

1. "In the majority of them it was due to occasional attacks of flatulent distention, which were accompanied by pain of a colicky nature. It was relieved by the passage of flatus or an action of the bowels. These attacks can be controlled by the habitual use of pure liquid paraffin and the wearing of a suitable abdominal support. An occasional small dose of castor oil was sufficient, in most cases, to

disperse it." In other words, although such patients felt a good deal better after operation, they were still constipated and required the habitual use of cathartics.

2. "Then there was another group in which the cause of pain was found in the distention of the blind end of the lateral anastomosis, which was originally the method adopted. It has only been necessary to obliterate these ends to cause a complete disappearance of the pain. To meet this cause, an end-to-side anastomosis is now adopted." Nothing is said here, in this connection, or elsewhere in Chapple's article, of any collection of fecal material in the excluded portions of the colon oral to the ileosigmoidostomy. The only operative indication for removal of the blind portion was "pain." In contrast to the careful *x-ray* studies of Nicolaysen, and the accurate, clinical records of de Quervain, Riedel, and Körte after ileotransversostomy, the statements of Chapple are incomplete. It would certainly seem worth while to show *x-ray* plates taken not only before ileocolostomy, but at different times afterward. Further, when secondary colectomy was performed, an adequate clinical history containing the salient facts covering the period between the two operations, together with operative indications and findings, would be of great interest.

3. The last and most serious cause of postoperative pain, according to Chapple, was due to inflammatory adhesions between the denuded area in the right iliac fossa following removal of the cecum, and an adjoining loop of small intestine. In some of the cases, adhesions reformed and had to be freed a number of times.

Chapple concedes that all the patients operated upon were not restored to a condition of perfect health, but "in a large number this has been done."

Of the 50 cases, 6 were in men and 44 in women. The histories appended leave much to be desired. One's interest becomes aroused only to meet with disappointing gaps in the historic information furnished. There is so much to be studied in this subject, that it is distinctly disappointing to get but fragmentary information from Lane's rich material.

RADIOGRAPHY IN INTESTINAL STASIS is the title of a recent article by Jordan,¹ in which the tenets of Lane are upheld. It appears as though normal anatomical conditions had been considered pathological in a number of instances. Several boldly made assertions seem at variance with generally accepted views. Parts of the paper are quoted below:

"Bismuth collects at the lower end of the ileum, in a group of coils normally placed above the pelvis. These coils are very likely to drop into the pelvis. . . . The heavy terminal coils of the ileum then

¹ *Lancet*, December 30, 1911, p. 1824.

drag upon the mesentery and exert a downward pull which involves the whole of the small intestine, and causes a downward drag upon the commencement of the jejunum, resulting in duodenal obstruction."

It may be remarked here that most standard text-books of anatomy expressly state that the terminal loops of the ileum lie in the pelvis and "the last portion of the jejuno-ileum reaches the large intestine from the left and below" (Gerrish).

Jordan continues: "This duodenal obstruction is not a permanent condition; in slight cases it is relieved at once when the patient lies down. It is worse when the patient is compelled to remain upright for long periods, and when he is, for any reason, in an exhausted condition. The mechanical consequences of the kinking are very obvious when they are looked for. The first result is distention; this is greatest in the first part of the duodenum,¹ the part which is unsupported and has a complete peritoneal covering. The next result is congestion, later ulceration occurs in the congested mucous membrane. It is necessary to bear in mind, however, that the kinking is intermittent; it is more severe when the patient is at his worst, as when he has been at prolonged hard work in the upright posture. The obstruction passes off after the patient has been kept in bed for some days."

"To take an example. A patient may have symptoms pointing to the presence of duodenal ulcer. The *x*-ray examination may provide indisputable evidence of the presence of duodenal kinking (and I have found such evidence very often in patients with symptoms pointing to duodenal ulcer). So far, the clinical diagnosis has been confirmed, for duodenal kinking, as already explained, is very likely to lead to a duodenal ulcer. We must not rest here, however; we must follow the bismuth meal farther, *and we shall find in every case some degree of kinking or obstruction at the lower end of the ileum.*² We may find very definite obstruction in this region; it becomes clear at once, therefore, that the mere treatment (whether medical or surgical) of the duodenal affection would not be a rational procedure. In following the bismuth meal still farther through the large intestine, we are likely to find further evidence of stasis, possibly of very severe stasis. Hence, it is clear that we are never wise in applying treatment for the cure of duodenal ulcer until we have investigated the entire alimentary canal. As a matter of fact, the duodenum is the only portion of the alimentary canal that is never affected singly.³

"Hence the operation of gastrojejunostomy for the cure of duodenal ulcer is not rational; this operation should be reserved for cases of actual organic stenosis of the pylorus or duodenum. I have now seen a large

¹ Is not this the well-known normal "bulbus duodeni" of Holzknecht?

² Is not a relative showing of contents in the lower ileum normal for many cases?

³ It would be of great interest to see this statement actually proved.

number of patients at various periods after having gastrojejunostomy performed for the cure of duodenal ulcer. No doubt many patients have obtained great relief from the operation, but it must be remembered that duodenal ulcer is a very readily curable condition, three weeks rest in bed sufficing, as a rule, to effect a cure.¹ Thus the recumbency necessitated by the operation would account for the cure of the duodenal ulcer, even though no new opening had been made from the stomach into the jejunum. It is true that duodenal ulceration is very apt to recur when the patient returns to his ordinary occupations, and this is frequently the reason for which patients consent to an operation. In the cases, few in number, in which the duodenum is the most serious point of obstruction, the result of gastrojejunostomy may be permanently satisfactory, although the patients are forever deprived of a great part of their gastric digestion. The fact should be borne in mind that the operation of gastrojejunostomy would be expected to do good by holding up the jejunum in such a position as to prevent the occurrence of kinking at the duodenojejunal junction for ever after. This good effect is procured quite independently of the making of a new opening between the stomach and jejunum; it is a benefit bestowed by accident.²

"In a great many cases, however, the relief obtained by gastrojejunostomy is merely temporary, not much greater, in fact, than would be obtained by simple rest in bed on a milk diet. I have now examined a considerable number of patients in whom the operation of gastrojejunostomy had been skilfully performed by eminent surgeons, but intestinal troubles still existed, or had returned after apparent cure. The symptoms complained of are varied; all have pain; many have vomiting, and the vomit usually contains bile and is very distressing; most exhibit all the signs and symptoms of intestinal stasis. An x-ray examination in such cases shows various conditions. In most, the bismuth meal finds its way out through the new opening at a rapid rate, so that nearly the whole of it will have left the stomach within half an hour, provided the patient remains upright.

"In a certain number of cases, a 'vicious circle' is produced, the bismuth leaving the stomach by the pylorus and returning once more by the new opening, carrying with it a large quantity of bile. This is vomited, with great pain and distress to the patient. With a view to avoid the possible creation of a vicious circle, some surgeons now actually close the pyloric aperture by a process of invagination at the time of performing the gastrojejunostomy. In other words, they first create a pyloric stenosis and then proceed to cure it by a gastrojejunostomy. Observing these cases subsequently by the fluorescent screen after a

¹ The standard treatment of acute gastric or duodenal ulcer by medical means takes much longer than three weeks.

² Is this not a trifle far-fetched?

bismuth meal, I have found that, while some of the meal passes out by the new opening, a portion is carried on by the powerful peristaltic contractions of the stomach beyond the new opening, and is seen to beat against the pylorus, which has become bulbous in form from the pressure of the gastric contents. The reason these patients are sent for an *x*-ray examination is pain, and there is no possible doubt but that the pain is due to pressure upon the closed pylorus.

"The conclusion—the only rational one that can be formed—is that the operation of gastrojejunostomy should only be performed for the treatment of actual gastric or duodenal stenosis, but not for duodenal ulcer unless in the rare cases in which a series of *x*-ray examinations, properly carried out, has demonstrated the absence of any marked kinking or stasis in the lower parts of the intestinal tract. Now these are the very cases in which duodenal ulcer yields readily to simple medical means with rest in bed, and ordinary precautions suffice to prevent a relapse." In short, ileosigmoidostomy is to cure duodenal ulcer. It would be difficult to find a more remarkable mixture of distorted facts and unsound theory.

Among a number of radiographs illustrating his article, Jordan shows one plate after implantation of the ileum into the sigmoid. Here the whole of the bismuth was in the rectum nine hours after ingestion, "proving that all intestinal stasis has been abolished." Conceding the possibility of such an apparent cure as is here produced by Jordan, there are other interpretations which might be given to such a picture. Perhaps exposures made later than nine hours might show regurgitation of bismuth into the sigmoid and descending colon. Again, perhaps this side-tracked gut was so plugged with inspissated fecal material that nothing further could enter it. Diarrheas after ileosigmoidostomy are not even touched upon by Jordan.

Observe the difference between the statements of Lane's disciples and Moynihan's¹ latest communication dealing with the same subject:

Moynihan says: "As a rule, in uncomplicated cases of duodenal ulcer—that is, in cases where obstruction has not yet developed—a most striking spectacle is afforded by the greatly increased activity of the stomach. Food begins to pass into the duodenum at once, and continues to pass with greater rapidity than in the normal condition. By the time the pain begins to appear, the stomach is nearly empty, and most of the bismuth has left the duodenum through which it shoots rapidly, and can be seen in the small intestine."

Moynihan is not prepared to say that "this condition of excitable and vigorous peristaltic movement in the pyloric antrum is characteristic of duodenal ulcer, but there is no doubt that it is almost constantly present."

¹ *Lancet*, January 6, 1912, p. 9.

As regards the relative frequency with which Lane's ileal kink and duodenal ulcer occur together, Moynihan says: "In a very small proportion of the cases the kink in the lower end of the ileum described by Arbuthnot Lane is found. In the last 87 cases of duodenal ulcer, it was present four times." Finally, "It is extremely rare to find, in cases of duodenal ulcer, any evidence, either upon *x*-ray examination or on the operation table, of an obstruction of any grade at the duodenojejunal flexure."

Hertz,¹ the radiologist at Guy's Hospital, London, of which Lane is one of the surgeons, states: "I am convinced that kinking of the duodenum plays no part whatever in the etiology of duodenal ulcer, as has recently been suggested, for nothing could be less likely to cause kinking than the hypertonic condition of the stomach present in duodenal ulcer."

"In a few cases I have seen a true kink near the end of the ileum, which has led to more or less obstruction, but, in every instance, this has been due to adhesions caused by an antecedent attack of appendicitis."

Regarding stasis in the colon, Hertz believes that most of the delay does not occur before the middle of the transverse colon is reached. He concedes having seen but one definite case of kink at the splenic flexure. As regards angulated flexures, he says that in a skiagraphic study, by himself and C. J. Morton, of fifteen normal young men, they found hepatic and splenic flexures quite as sharp as in any case of visceroptosis. Codman² warns against hasty conclusions about angulation of the colon at the flexure shown on a single *x*-ray plate. "The real question is whether these angulations are passed on time—not whether they appear in the picture."

The most noteworthy American publication on the subject of intestinal stasis was Jabez N. Jackson's³ article on "Membranous Pericolitis" in 1909.

The stage of recognition of this condition has passed; now efforts are being made to find an adequate explanation and means of relief, either surgical or medical. We hope further observations will reveal its essential etiological factors so clearly, that practical prophylactic measures may be indicated and found. The foundations of pericolitis, enteroptosis, etc., are perhaps to be looked for in the gastroenteritis of infancy. It would be interesting to know how large a proportion of costive, enteroptotic, neurasthenics were "feeding cases," during their early infancy.

¹ British Medical Journal, February 3, 1912, p. 225.

² Boston Medical and Surgical Journal, January, 1912.

³ Surgery, Gynecology, and Obstetrics, September, 1909, p. 278.

THE APPENDIX

Rovsing's Pain Phenomenon. In 1907, Rovsing¹ published a supposedly pathognomic symptom of appendicitis, namely, that pain in the right iliac fossa, which was evoked by pressure upon the descending colon in the left iliac fossa was due to acute appendicular disease.

Recently, Hausmann² has justly criticized this statement. According to Rovsing, the pain evoked in the right iliac fossa was due to the transmission of increased pressure of intestinal gas along the entire colon from the point of compression back to the cecum. Hausmann very sensibly remarks that the pain at McBurney's point can be evoked by pressure not only upon the descending colon, but upon adjacent regions in the left iliac fossa without touching the descending colon. Intra-abdominal tension is increased by pressure applied in any locality, and this general increase causes pain at the site of inflammation. The higher such intra-abdominal tension is, the less the amount of local pressure needed to evoke such pain. Conversely, with no intra-abdominal pressure—with slack abdominal walls and intestines empty of gas—Rovsing's phenomenon is often not obtained. The large intestine is too elastic and adaptable a tube, and the distance from the descending colon to the cecum is too great, for the displacement of a few cubic inches of gas in the descending colon to cause any increase in pressure at the cecum.

In short, the pressure applied in the right iliac fossa is directly transmitted to the adjacent abdominal contents (small intestine) and by this medium, is transmitted to the entire abdomen.

Nor is Rovsing's symptom pathognomonic for appendicitis; the pain of any acute intra-abdominal inflammation, such as cholecystitis, salpingitis, etc., may be increased by pressure applied elsewhere than at the site of the trouble.

Lauenstein³ and Perman⁴ agree with Hausmann that although Rovsing's explanation of his symptom was wrong, nevertheless his observation of indirect abdominal pressure causing pain at the site of inflammation is correct.

Bacteriological and Experimental Investigations Regarding the Etiology of Inflammation of the Appendix, with Especial Reference to the Anaërobic Bacteria, is the title of a splendid monograph by M. Heyde, of Friedrich's Clinic, in Marburg. The work extended over a period of three years, and is by far the most important done in this field since that of Runeberg, in 1908.

The article is valuable not only for the positive information it conveys

¹ Zentralbl. f. Chir., 1907, No. 43.

³ Ibid., p. 1049.

² Ibid., 1911, p. 794.

⁴ Ibid., p. 1593.

regarding appendicitis and peritonitis, but also for the ideas it suggests regarding such processes as the chronic intoxications of gastro-intestinal origin, inflammations of the genito-urinary tracts, etc. In fact, the chief importance of this contribution consists in the demonstration that anaërobic microörganisms are present in all inflammatory conditions to a far greater extent than has been heretofore believed. This fact naturally suggests the idea that if still more knowledge be gained regarding anaërobic organisms and their relation to acute and chronic inflammations, much light may be shed upon chronic diseases that are supposed to come from low-grade, persistent intoxications.

In the course of this abstract repetitions occur and are made purposely to emphasize certain important fundamental facts.

Heyde begins his article by stating that although mention was made in the works of previous observers, of both aërobic and anaërobic organisms, the aërobic forms received most attention. The more careful authors mentioned the presence of other "unidentified" forms besides the familiar aërobic cocci and bacilli. Others, whose superficial work displayed more volume than accuracy, practically disregarded the presence of anaërobic organisms in the exudates studied. The study of anaërobic forms at that time presented technical difficulties which, have been somewhat lessened during recent years by the discovery of simpler methods.

Of recent observations, those by Heile and Runeberg deserve especial mention. Heile described an organism which belonged to the *Bacillus mesentericus vulgaris* group. It was a spore-bearing bacillus which stood between the proteus and hay bacilli. It was a facultative anaërobe and a powerful putrefactive agent. All the cases in which it was found, presented grave clinical pictures. The organism in pure culture did not prove very virulent for animals, but, when injected together with other non-virulent organisms, gave rise to marked signs of toxemia.

Runeberg's work on the anaërobes of the intestinal tract included careful morphological and biological studies. Among the numerous forms encountered, there were none which had a marked invasive power. Numerically, the anaërobes predominated over the aërobes. These same anaërobes were found in peritonitis due to appendicular inflammation. No especial type of anaërobe seemed to be the cause of any particular form of peritonitis.

Following these two men Heyde endeavored, in the course of his investigations, to gain answers to the following questions: (1) What anaërobic types are to be found? (2) How frequently do they occur? (3) Do particular forms predominate at different stages of appendicitis?

TYPES OF CASES STUDIED. Heyde used as recent cases as possible—those of a few hours' standing—to determine whether anaërobes were

present in the very early stages of appendicitis, and further, whether they were present in purely suppurative types of infection, or occurred only in the presence of putrefaction.

Certain previous authors contended that anaërobes invaded the tissues only after pyogenic forms had first injured it. Therefore, it seemed to Heyde that an investigation of forms of appendicitis with no gangrene (inflammation only) was of the utmost importance. However, examination of all forms was made. Acute inflammations, gangrene, perforation, abscess, and all the various types of peritonitis were carefully studied. Parallel bacterial examinations of appendicular contents and of co-existing peritoneal exudates were invariably made. Thus the thicker pus nearer the appendix, and the clearer exudate farther away, were both examined to see what bearing their bacterial contents had upon the question of secondary invasion by anaërobes. Residual abscesses following diffuse peritonitis were also examined as a control for the previous findings at the primary operation.

TECHNIQUE EMPLOYED. The material obtained was examined promptly because, if allowed to stand at room temperature, (1) *Bacillus coli* by its rapid growth obscured and distorted the true bacteriological conditions originally present, and (2) certain anaërobes, which were extremely susceptible to exposure to air, died off very rapidly.

Heyde remarked that, when one considered the profusion of bacterial forms encountered in peritoneal exudates, it seemed remarkable that a large number of bacteriological investigators should have ignored the majority of these, and have been satisfied by enumerating only the common forms of cocci and the *Bacillus coli*. Experience showed that *certain anaërobes grew better in the presence of aërobes. Apparently, the acid production due to the presence of Bacillus coli and the aërobic cocci seemed to favor the growth of certain anaërobic forms.*

The technique of Heyde's investigations took much time and labor. He stated that one hour was the very least required for giving proper attention to freshly obtained specimens of peritoneal exudate and to the inflamed appendix with its contents; further, that from one to two months were necessary for a complete study of the isolated strains obtained from any given case. The *Bacillus coli* gave much trouble because of its power to rapidly overgrow other forms and because of its resemblance to some of them. Heyde frankly stated that, it was mainly the fault of this organism, that so few workers had had the fortune to obtain useful and accurate results in this field of investigation.

In order to give an idea of the magnitude and complexity of the problem, all the forms encountered have been enumerated below. Only points of general interest are mentioned in connection with each variety. Details of bacteriological technique have been purposely omitted.

AËROBES. The *Bacillus coli* was found to have a short span of life. The presence of fermentable material was necessary for its florid growth under anaërobic conditions. Heyde does not believe that, within the animal body, the *Bacillus coli* is able to split up proteid with the formation of putrid products. He believes that this supposition, which has been so widely held, was due to overlooking the existence of anaërobes which were present at the same time. The chief importance of *Bacillus coli* lies in its role as an accompanying bacterium in symbiosis with anaërobes. In other words, in the majority of cases studied, no *aërobic* organisms were found which could be definitely considered as causing the existing gangrene, or as giving rise to the foul-smelling substances encountered. *Bacillus coli* in particular showed none of that ability to form foul-smelling products credited to it by so many authors.

AËROBIC COCCI. Pure cultures of pneumococcus were not found in peritoneal processes of appendicular origin in children.

The streptococci found, proved distinctly virulent by animal inoculation.

Staphylococcus aureus and *albus* were occasionally found, but did not merit especial notice.

ANAËROBES were found well able to cause non-fetid suppurations. Both bacilli and cocci were encountered.

A. Anaërobic Spore-forming Bacilli, showed strong resistance to heat—80° C. being successfully withstood for ten minutes.

The forms seen of this class were:

1. *Fränkel's gas bacillus*.
2. *Motile butyric acid bacilli*; these were of less importance.
3. *Putrefactive butyric acid bacilli* were found to be harmless when grown in pure culture. But, in animal experiments, in symbiosis with *aërobic* streptococci or *Bacillus coli*, they caused progressive ichorous phlegmons. In human beings, putrefactive butyric acid bacilli were repeatedly found in fetid or gangrenous phlegmons accompanied by *aërobic* organisms. It seemed as if the presence of these *aërobes* favored their growth.
4. The *bacillus of malignant edema* was found pathogenic for animals, and a hemorrhagic exudate, swarming with bacterial forms, was characteristic of infections caused by it.
5. Cultures of the *pseudotetanus bacillus* had a characteristic foul odor similar to the smell of foul peritoneal exudates. Upon injection of cultures there was no immediate pathogenic effect, but the animals died within two weeks of a progressive cachexia. The same cachexia was caused by injection of filtered dead cultures.
6. *Putrefactive spore-forming bacilli* stood heat well (boiling water for ten minutes), and were very resistant to air. Following the injection of cultures of these organisms, animals died of gradual progressive marasmus.

B. *Anaërobic Non-spore-bearing Bacteria* (influenza-like).

(a) *Gram-negative Bacilli*:

1. *Bacillus thetoides*. Its cultures had a fetid odor. It showed greater resistance to free oxygen than other asporogenic anaërobes. It showed marked polymorphism. In animals, certain strains proved non-virulent. Intraperitoneal injections of cultures together with lactic acid caused death in twenty-four hours with production of a foul-smelling, hemorrhagic exudate with fibrin deposit. Injection of cultural filtrates caused gradual cachexia, with death in about fourteen days.

2. *Bacillus fusiformis*, *per se*, was not pathogenic (animal inoculation). In symbiosis with *Bacillus coli* and streptococci it lived in tissue long without any definite pathogenic result. Injection of cultural filtrates caused gradual cachexia.

3. *Bacillus sassmannshausen*, and (4) *Bacillus* "A" showed qualities which are of interest to the bacteriologist alone.

(b) *Gram-positive Bacilli*:

1. *Bacillus ramosus* showed no especially important characteristics.

2. *Bacillus ramosoides* showed a marked polymorphism. It was found to be an extremely resistant organism, capable of living for six to eight weeks at room temperature, provided that the media upon which it grew were not allowed to dry up. Mice inoculated with pure cultures died with tetanic symptoms. The organism was not pathogenic for rabbits or guinea-pigs and yielded no positive results in symbiosis.

The (3) *Bacillus* "D," the (4) *Bacillus* "M," and (5) certain pigment-forming bacilli, occurred, but betrayed no characteristics of especial interest.

Certain (6) *fusiform bacilli* and *spirochete* will be mentioned later in connection with thrombophlebitic processes to which they apparently bore definite etiological relation.

C. *Anaërobic Cocci*:

Streptococci. The presence of proteid substances was necessary for their growth. In pure culture they were not pathogenic for animals, but in symbiosis with other anaërobes or *Bacillus coli* they were markedly pathogenic. The anaërobic *Streptococcus putridus* (Schottmüller) has invasive powers, and is found not only in local processes, but also in cases of peritonitis in connection with thrombophlebitic changes. These bacteria invade the blood, cause changes in other organs, and evoke the picture of a true sepsis.

Staphylococcus parvulus occurred, but deserved no especial mention.

COMPARISON OF VARIOUS BACTERIAL FORMS OBSERVED. There was a marked polymorphism of many forms, not only in the spreads made at the time of obtaining the fresh material, but also in the subsequent cultures. The polymorphism was especially marked in the younger forms, while, as cultures became older, there was a tendency to grow

according to simpler and more uniform types. This observation led Heyde to assume that probably the same organisms assumed a different aspect in acute processes from that which they showed in chronic lesions or in culture.

The bearing of spores by some bacilli occurred only under certain ill-defined circumstances.

The resistance to heat (spores) and the longevity of other forms were remarkable.

It was found that anaërobes can exist and grow in the presence of air where decomposition of organic material is taking place.

Great susceptibility to the deleterious effect of the air was shown by those anaërobes which did not produce gas.

Asporogenic anaërobes were found subject to changes in character by factors which influenced them during their growth in the animal body, and while their "acclimatization" was going on during the course of an infection.

Blood cultures were made in peritonitis, and, in accord with previous experience, were found negative. This was taken to indicate that the appendicular process is largely a local one. The agonal invasion of all forms of bacteria into the blood has no direct bearing on the subject in hand.

INVESTIGATION OF INTESTINAL CONTENTS IN APPENDICITIS was made, with comparison between the flora of the gut and the forms found in the appendix and in the peritoneum of any given case. The normal stool was examined and found to contain large numbers of bacteria capable of breaking down proteid bodies with the formation of putrefactive products. In the commoner types of appendicitis and peritonitis, no marked differences in the stool (bacteria) from normal were noted. A rare but important exception to this occurred in those forms of peritonitis due to butyric acid bacilli. These cases had histories of previous disturbances of intestinal function, usually diarrhea. The diarrheal stool of two of these peritonitis cases gave butyric acid bacilli (*B. perfringens*) in practically pure culture. Severe intoxication and infection is characteristic of the appendicular process due to these organisms.

CONSIDERATION OF THE DIFFERENT FORMS OF APPENDICITIS ENCOUNTERED. *Suppurative Inflammations of the Appendix.* Usually one or two bacterial forms predominated. Anaërobic forms (*B. ramosoides* or *B. thetoides*) occurred in profusion. There were a few aërobic forms (*B. coli*). There was no characteristic clinical picture due to infection by any one of the individual bacterial forms. The fibrinous peritoneal exudate contained practically only anaërobes (*B. ramosoides*). In the peritoneal exudate from such appendicular lesions, anaërobes and *B. coli* were found. This seemed to indicate that in the early stages of

purulent or fetid purulent appendicitis, anaërobic organisms are almost never absent.

Gangrenous appendicitis was marked by a greater profusion of bacterial forms than the suppurative type. Here, too, *B. coli* and *B. thetoides* had a prominent place. The spore-forming bacilli were more frequently found in this type of lesion. Abscesses near the appendix yielded the same organisms as the appendix itself. In the peritoneal exudate there were much fewer organisms than in the abscess, or the gangrenous appendix, but here, too, the anaërobes preponderated, and among the anaërobes *B. thetoides* was the most plentiful.

Diffuse Peritonitis. Butyric acid bacilli deserve especial mention in this connection. The cases in which they occurred always showed extremely severe types of infection. Besides the butyric acid bacilli, the bacillus of malignant edema and streptococci occurred, to the numerical exclusion of other forms. There was a practically total gangrene of the appendix, often without perforation. The exudate was usually sero-purulent, and occasionally slightly hemorrhagic. There were no adhesions. Clinically, there was but slight elevation of temperature, in marked contrast to an extremely rapid pulse. This complex will be referred to again.

One case of diffuse peritonitis showed a pure culture of anaërobes. On the other hand, aërobic pyogenic streptococci occurred with relative frequency. In other cases of peritonitis, a number of forms were present, among which the anaërobes predominated both in species and numbers.

In the secondary abscesses following diffuse peritonitis, certain forms predominated which formerly had but occasionally been seen.

Appendicular Abscess. In these, there was a plentiful assortment of bacterial forms. The anaërobes predominated. As the abscesses grew older, the bacilli died off (an old, well-known fact).

Examination of Appendices Removed in the Interval. Here the bacterial flora varied according to whether the appendix contained mucus or feces. When mucus was present, relatively few bacteria were found; chief among these was the *B. coli*. But when feces were present in the appendicular lumen, the bacterial flora were identical with those of the intestinal contents. Here *B. coli* and *B. thetoides* predominated.

As regards the relationship of *angina to appendicitis*, it was found that there was no parallel between the bacterial contents of the tonsillar exudate and of the material within the lumen of the appendix.

CONSIDERATION OF THE BACTERIOLOGY of the 102 cases so exhaustively studied, led Heyde to believe that symbiosis played a great role in the breaking down of proteid substances with the production of putrefaction.

Toxicity seemed to have direct connection with the alkaline reaction of putrefying pus. It is not known why bacteria which, upon artificial

media form acid, are able to cause production of alkaline putrefaction in the peritoneum and in the interior of the appendix. Symbiosis under the especially favorable condition in the body (appendix) constitutes a complex the factors of which we cannot reproduce in the laboratory. This may explain why we find organisms in a gangrenous appendix, not one of which in pure culture produces putrefaction in artificial media. No toxins were obtained by culture of any of the bacteria studied, the injection of which led to the rapid death of animals. It was surprising that frequently the most foul-smelling cultures were endured the most easily by the animals. In fact, it was astounding to see the quantities of foul-smelling fluid which could be injected into the peritoneum without causing any change in well-being, while injection of other cultures, whose odor was far more tolerable, caused the severest prostration, etc.

Comparison was made between the toxicity of freshly obtained pus and the toxicity of the organisms found in the pus after their artificial cultivation, either in pure culture or in symbiosis. In every case the toxicity of the original pus far exceeded that of material obtained through artificial growth. Hence, it seemed reasonable to suppose that the severe toxemias so frequently seen at the sick bed are due to the symbiosis of different bacterial strains, be they merely different anaërobic forms, or both anaërobes and aërobes.

The *adaptation of anaërobes to their host*, is an important factor which plays a far greater role with them than with aërobes. Certain saprophytic forms may, under some circumstances, acquire parasitic faculties. This idea might account for the findings where a new, heretofore unknown anaërobic bacterium has been found pathogenic for man, but has proved non-pathogenic upon animals. In other words, negative results with anaërobic bacteria upon animals do not justify conclusions regarding their influence upon man.

In symbiosis, certain forms pave the way for others. Again, some forms may be made more active in producing poisons by the presence of other forms. Lastly, certain substances may be produced in symbiosis which cannot be produced by either organism alone.

Bacteria which feed on fermentative substances develop well in the intestine, but their growth is checked in the peritoneal cavity. The change from saprophytic to parasitic tendencies is accomplished with difficulty, but when once established as parasites, such organisms must be regarded as capable of causing the severest forms of infection.

Is Putrefaction in Gangrene Primary? Certain forms cause necrosis but not putrefaction, and here the putrefaction is a secondary process.

Both the questions of the etiology of gangrene and the change of an organism from saprophytic to parasitic tendency will be referred to again a little later.

Boit and Heyde conducted a series of experiments to determine

whether it was possible to produce a gangrenous appendicitis by the introduction of very virulent material alone, without the employment of mechanical or chemical injury. These experiments were conducted upon dogs. The material used was either the appendicular pus obtained at operation, or mixtures or pure cultures from such pus. A fine opening was made in the cecum through which a cannula was introduced so that its tip could be inserted into the lumen of the appendix. By this means agar, infected with the material mentioned above, could be placed in the appendix, the base of which was then tied lightly with a ligature to prevent escape of the contents. Attempts made with this material were not successful.

The experimenters again attacked the problem by using bacteria from dogs' feces. Here, an increased virulence was first obtained by the production of gangrenous abscesses or gas phlegmons, after which tissue or pus from such lesions was introduced into the appendix. If material of sufficient virulence was employed, destructive lesions of the appendix wall could be caused. To heighten this effect, a wad of castor oil-soaked gauze was introduced after the pus-soaked one, or, an enteritis was produced by the plentiful administration of castor oil previous to inoculation of the appendix with infectious material. *In these experiments it was possible to cause at will, depending on the choice of infecting material, either more purulent or more gangrenous forms of appendicitis.* The peritoneal lesions evoked were similar to those found in human beings. From their experience, Boit and Heyde held that minute lesions of the epithelial surface, a previously existing and so far harmless catarrh, and finally, stagnation of appendicular contents, must all be conceded as possible predisposing factors to appendicitis. Further, that the possibility of a primary bacterial necrosis of the mucous membrane must also be acknowledged.

To elaborate their experience the same observers conducted a further series of experiments to determine the bacteriology of peritonitis following small perforations of the large intestine, of the small intestine, and of the appendix. Their findings confirmed the well-known fact, established years ago by Harvey Cushing's work upon the bacteriology of the alimentary tract, that the forms of peritonitis arising from injuries of the colon were far more serious than those due to injuries of the gut higher up. This was due to the greater number of bacteria present in the large intestine.

Boit and Heyde found that the perfringens group of bacteria (butyric acid bacteria) outstripped all others in rapidity of growth. The exudate they caused was hemorrhagic and poor in leukocytes.

When the perfringens groups occurred in combination with *Bacillus coli*, the character of the exudate changed; after the first rapid growth of the anaërobes, the *Bacillus coli* and other organisms began to grow rapidly, and, by their overgrowth, checked the development of the

anaërobes. Here the fibrinopurulent character of the exudate persisted until the death of the animal.

The normal empty appendix was found to contain very few organisms, and therefore perforation of it was not attended with serious consequences. There was not the persistent escape of bacteria from its lumen which occurred in lesions of the small or large intestine. Fresh adhesions rapidly closed the opening, and the few bacteria which had escaped, died.

In peritonitis where aërobes were in the majority, at first a marked phagocytosis was in evidence, and only later, when many other bacterial forms made their appearance, were the leukocytes overwhelmed. On the other hand, where the anaërobic butyric acid bacilli reached the peritoneal cavity first, the victory remained on their side from the onset.

THE PATHOGENESIS OF APPENDICITIS. The process seems to be a primary bacterial infection with secondary necrosis.

Hematogenous infection of the appendix rarely, if ever, occurs. Heyde takes Aschoff's stand on this. He found nothing in his bacteriological studies to substantiate the theory of hematogenous infection, but much to controvert it.

Angina weakens the organism and therefore predisposes to inflammation of the appendix and other tissues, because of lessened general bodily resistance. As said before, the bacterial examination of tonsillar exudates and appendicular contents from the same individual showed no similarity. The transfer of infectious material by the alimentary passage, although more likely than by the blood stream, was not proved in the few cases observed.

Enteritic Processes. Only in a few cases could these be considered the primary cause of an appendicitis. It was very rare for the same organism to be found in preponderating numbers in the appendicular process and in the intestine. On account of these results, Heyde felt compelled to look upon appendicular inflammation as an "altogether local process." The bacteria apparently acquired pathogenic properties through local changes (stagnation), which tended to increase their virulence.

Heyde does not exclude enteritic processes as predisposing factors in the production of appendicitis, and he states that the catarrhal processes so often occurring in infants may leave behind deposits of connective tissue—scars or adhesions—which, in later young adult life, may furnish predisposing factors for appendicitis.

Certain bacterial forms occur in appendicitis which are not found in the normal stool; and further, but a certain part of the intestinal flora is found in inflammations of the appendix. Usually only three or four kinds of organisms occur in any given case of purulent appendicitis. The anaërobes preponderate over aërobes. Among the 102

cases studied, in only 2 were aërobes present by themselves. In many others, anaërobes alone were present in the very earliest stages of the malady. Purulent appendicitis can be evoked by anaërobes alone. The most frequent of these was the *bacillus ramosoides*.

Gangrenous forms of appendicitis showed greater profusion of bacterial forms. The character of the inflammation during the first stages of the process was determined by the types of bacteria which had gained a foothold. In other words, Heyde thinks that, depending on the type of organisms present, the gangrenous forms started as such from the very outset. It was conceded, however, that purulent forms could, later on, readily become gangrenous. Further, it was certainly no coincidence that gangrenous affections of the appendix were most frequently observed where its lumen contained feces or coproliths. In the later stages of the process secondary invading forms blurred the bacteriological picture.

To repeat, there is proof, both clinical and experimental, that types of inflammation (purulent or gangrenous) vary according to the varieties of bacteria present. In the gangrenous forms, a greater number of bacterial forms are present from the very beginning than in purulent types of inflammation. Study of all the facts does not convey the impression that a secondary invasion from the gut may produce gangrene. In cases of gangrene, the particular forms that have the power of setting up putrefactive processes seemed to be in especial evidence. These different forms could be divided into two parts. Thus, on the one hand, there were those which, besides causing putrefaction, were able to evoke purulent inflammations, namely *B. thetoides*, streptococcus and aërobius, etc.; on the other hand, there were other forms in which marked powers of invasion were lacking, and which only developed in symbiosis with others, for instance, the pseudotetanus bacillus, the putrefactive, spore-bearing anaërobes, etc.

The idea of a chemical peritonitis—peritonismus, peritoneal irritation—has been markedly circumscribed by the findings of Runeberg, who showed how easily mistakes could be made in investigating this condition. For instance, he demonstrated that in spite of negative results reached by animal inoculation with apparently sterile exudates, bacterial fragments within the leukocytes were present in such fluids. Recognition and study of the heretofore largely neglected anaërobic invasion of the peritoneal cavity shows, that microbial growth penetrating the walls of the inflamed appendix is very rapid, that anaërobes are found in the fibrin flocculi upon the serous surface of the appendix and intestines, and that occasionally a few aërobes accompany them. In the vast majority of cases the first organisms to reach the peritoneal cavity are the anaërobes, and, having once reached it, the invading microorganisms tend to grow along the surface of the serosa. The

anaërobes possessing an ability to set up infectious processes have great power to destroy leukocytes.

It has been demonstrated that certain purulent exudates of recent origin are actually sterile. This confirms previous observations made by many surgeons of experience.

The physical character and external appearance of an exudate does not indicate either its bacterial content nor the degree of danger to the patient.

The standpoint of modern surgery that for practical purposes such recent exudates are sterile is well taken, for, by removing the chief source of infection, the peritoneum is enabled to cope with the few remaining organisms. The thin exudate at a distance from the infecting source contains less forms of organisms and fewer numbers than the thicker exudate which is nearer to the infecting source, and in which more bacterial forms and greater numbers are present.

CERTAIN SPECIAL TYPES OF INFLAMMATION HAVING AN APPARENT DEFINITE RELATION TO CERTAIN INFECTING ORGANISMS WERE NOTED.

(a) *Anaërobic butyric acid bacilli and the bacillus of malignant edema* rarely occurred in peritoneal affections, but, when present, set up the gravest processes. Examples of a number of such infections were observed. Most of the cases occurred in the spring or fall. Their course was extremely acute. Clinical manifestations at the beginning of the illness were in marked contrast to the local findings. In early cases, operation was often determined upon by the condition of the pulse alone, for neither the temperature, nor the general or local conditions furnished a hint of the far-gone destruction revealed by laparotomy. The cases of longer standing showed a hopeless diffuse peritonitis. The exudate had a sour smell and was at times somewhat hemorrhagic. The appendix was diffusely gangrenous, and often showed no macroscopic perforations. It was occasionally the seat of hemorrhagic infarction. The prognosis was unfavorable. Fortunately, the occurrence of these severe forms is rare.

(b) *Fusiform bacilli and spirochete* were found in especial profusion in a few instances where thrombophlebitic processes, with subsequent liver abscesses, developed. This type of infection did not occur frequently, but, where bacteriological examination showed especial profusion of these forms, the gravity of the prognosis was greatly increased. At removal of the appendix a dry peritonitis was found with small, foul abscesses in the mesenterium or septic thrombi in the vessels. After an apparently smooth course, progressive thrombophlebitis (suppurative pyelephlebitis) and liver abscess developed.

Usually, however, no parallel relations could be established between the clinical picture and the varieties of infectious organisms present.

The varied results of observers in different countries may well be due to the difference in the food commonly eaten, and this is all the more

likely, since we know that the character of the intestinal flora depends largely upon the sort of food eaten. Hence it is most likely that the endemic occurrences of appendicitis are due to such articles of diet as butter, bread, or milk.

In the light of recent communications, it may be well to point out that *Bacillus coli* does not occupy the prominence it formerly held in peritonitis. It rarely attains such a degree of virulence that it deserves to be called truly parasitic. However, the significance of this organism must not be underestimated. Under ordinary circumstances *Bacillus coli* overgrows other bacteria, but under pathological conditions this ability is markedly decreased. Heyde believes that, in symbiosis, it may act as an activating agent to other anaërobic organisms, and that extinction of one organism may confer greater resistant powers to the surviving variety. The rapid death suffered by the *Bacillus coli* in pathological conditions of the peritoneum seems to lend weight to this view.

CONCLUSIONS. Anaërobes are present in greater profusion than aërobes in all stages of appendicitis and peritonitis. They invade the abdominal cavity sooner than aërobes, and, without aërobic accompaniment, may spread over the surface of the serosa. Anaërobes are found in purulent inflammation of the appendix, in gangrene, and in cases of rapid destruction of the entire organ.

They are the direct cause of inflammation, and they break down the necrotic proteid material with production of poisonous substances.

While not excluding aërobes, it is impossible to consider the process of appendicitis without according the anaërobes their true place.

The toxemia present, is due to them. The toxins act quickly or slowly, according to the character of organisms present. Certain individuals who can apparently overcome the deleterious effects of the local trouble, succumb later to the consequences of the bacterial poisoning of other organs.

By animal experiment only and not by the test-tube, can the conditions be reproduced, that lead to the development of such deleterious products of metabolism, as are found in peritoneal exudates due to appendicitis.

Certain organisms seem to have an especial etiological significance in certain (rare) types of infection.

Two interesting examples of—

Movable Inflammatory Tumors of Appendicular Origin are reported by Joffe.¹

I. A woman, aged forty years, in whom a movable tumor the size of a fist occupied the umbilical region. Operation showed an abscess whose

¹ Russki Vratsch, 1911, No. 9.

walls were composed of cecum, mesocolon and loops of small intestine. Appendectomy; recovery. (A. G. Gerster's mesoceliac abscess.)

II. A man, aged twenty-nine years, operated upon with a diagnosis of intussusception. To the right of the umbilicus there was a movable kidney-shaped tumor. The abscess lay behind the cecum. Death after three days. Autopsy: retrocecal and adherent appendix; three perforations. A loop of small intestine adjacent and adherent to the cecum, was displaced upward and behind it. The loop also covered the appendix. Another adherent loop of small intestine helped to define the close cavity, within which lay the appendix. This cavity was located in the fossa subcecalis, between small intestine behind and the cecum in front.

. Appendicular Abscess Treated with Pure Carbolic Acid and Iodoform. Maylard¹ reported having successfully used this procedure in 27 cases of appendicular abscess. The abscess cavity, after being emptied, was wiped out with pure carbolic acid and was then dusted with powdered iodoform. The abdominal wall was closed with through and through sutures around a medium-sized drainage tube. The appendix was invariably removed. In all these cases the postoperative course was uneventful. This use of pure carbolic acid seems to be a rather bold procedure, its safety needing further confirmatory evidence.

Pressure Necrosis of the External Iliac Artery after Drainage of Appendicular Abscess has been recently reported by Caraven and Basset.² The rubber drainage tube leading from the pelvic abscess to the abdominal wound, impinged on the artery. The hemorrhage occurred five and one-half days after operation. The artery was tied between two ligatures. Recovery followed with perfect function of the right leg. The pulse could again be felt in the femoral and dorsalis pedis arteries at the end of fourteen days. A similar unpublished case of Quinard was also quoted by the authors.

Bertier and Wiessenbach³ report a similar case in which the drainage tube was removed on the sixth day. Two hours afterward there was a fatal hemorrhage from the external iliac artery. Pathological examination of the artery indicated necrosis from pressure.

The Late Results of Appendectomy in 640 cases are reported by Scudder and Goodall.⁴ Of this series, but 61 patients were operated upon between one and five years previously, while 560 had been operated upon five to fifteen years previously. Of the total number, 606 (94.6 per cent.) were in first rate health. The remainder who were in poor health after operation had definite pathological reasons for this, aside from their appendicular condition. Practically half the

¹ British Medical Journal, March 25, 1911.

² Rev. de Chir., vol. xxx, ann. No. 12.

³ Bull. et Mém. de la Soc. Anatom. de Paris, 1911, No. 2.

⁴ Boston Medical and Surgical Journal, July 6, 1911, p. 6.

cases were acute and needed drainage, and the other half were healed by first intention. Hernia developed in the cicatrix in 17 per cent. of the drained cases, and in 3 per cent. of the undrained cases. It is my impression that the percentage of hernias after drainage in appendicitis is not as large at present as such figures would indicate. The constant tendency at the present time is to manage with smaller, thinner drains and remove them much sooner than was formerly the custom, nowadays also, more attention is paid to protecting nerves which may be encountered, hence a proportionate decrease in the occurrence of postoperative herniæ is to be awaited.

THE RECTUM

Removal of Uterus and Adnexa in Extirpation of Rectal Carcinoma is discussed by Albertin, Goullioud, and Tixier in a recent number of the *Lyon Chirurgical*.¹ Albertin removes the uterus, adnexa, and rectum, together with the cellular tissue, in one mass by the combined route. He considers that there is less danger of going through carcinomatous tissues by this method than by that of Tixier, who first removes the uterus before attacking the rectum. Only one of three patients survived this operation.

Goullioud's indications for removing the uterus and adnexa are: (1) If they are adherent to the rectum; or (2) when such removal facilitates the extirpation of the rectum. He also removes rectum, uterus, and adnexa, together with the posterior vaginal septum *en bloc*, when this is feasible. The pelvic colon is preserved, and is used to close the peritoneal cavity afterward. Goullioud's results are better than those of Albertin. Of 4 cases of his, in which extirpation of the internal genitalia, together with the rectum, was performed, all patients survived the operation; 3 died, however; 1 sixteen months later from recurrence; another of pulmonary embolism forty-two days after operation; and the third of a wound infection, twenty-five days after operation. The fourth patient is well over one year. Still another patient was reported well after more than two years. Here, a preliminary right iliac colostomy was followed fourteen days later by removal of the uterus and adnexa, together with resection of the rectum. The intestinal lumen was reestablished by end-to-end suture anastomosis.

Both preceding authors fashion a peritoneal flap from the anterior surface of the uterus as an aid in the subsequent peritoneal closure.

Tixier, the chief advocate in France of removal of the uterus and adnexa as a preliminary step in the extirpation of rectal carcinoma, reports excellent late results. He says that this method is indicated

¹ *Lyon Chirurg.*, 1911, vol. v, pp. 109, 114, and 135

when the carcinoma, on account of extensive involvement or high location, is unsuitable for attack from below. As regards hysterectomy, it is immaterial whether or not the uterus is affected. Finally, when the sphincter can be left intact, hysterectomy is necessary in order to provide enough room for performing a satisfactory suture of the gut.

Practical Experience with the Rectosigmoidal Arterial Anastomosis. Riese,¹ in speaking of the combined method of operation for carcinoma of the rectum, stated that the chief danger of the procedure still lay in the possible subsequent development of gangrene of the intestine—and this in spite of the respect paid to recent anatomical studies dealing with anastomoses of the hemorrhoidal arteries²—because, practically, it is not feasible to determine the proper point for safe ligation.

A Method for Substituting other Portions of the Intestinal Tract for the Excised Rectum without Danger of Gangrene, is the title of a short article by Ali Krogius,³ which is so interesting and instructive that we have considered it worthy of translation *in extenso*. Krogius writes: “After all operations for carcinoma of the ampulla, *i. e.*, upper portion of the rectum, the restitution of the intestinal passage down to and through the sphincter ani, is most desirable, in order to spare the patient the inconvenience of an artificial anus. It is conceded by all authorities that the accomplishment of this most desirable object is at times very difficult and even impossible, because of the danger of gangrene in that portion of the intestine which has to be pulled down. Recent investigations regarding the vascular supply of the lower part of the large intestine have only succeeded in more accurately defining the factors of this danger, without furnishing a remedy which will act with certainty in all cases. In operations by the dorsal route at least, the old uncertainty has remained, for it must be more or less a matter of luck whether the mobilized and pulled-down portion of the intestine remains alive or becomes gangrenous. Only by laparotomy can ligation of the superior hemorrhoidal artery be performed at the proper point with any degree of accuracy.

“In the course of an operation which I recently performed for excision of a carcinoma of the ampulla of the rectum, I believe I have found a good method of avoiding this danger of gangrene after operations by the dorsal route. In this case, the rectum was freed according to the coccygeal method of Kocher. After the opening peritoneum, an attempt was made to mobilize the intestine so that it could be brought down to the intact anal portion in order to effect a restitution of continuity. On account of the shortness of the pelvic mesocolon, further mobilization of the gut was accompanied by unusual difficulty, so that

¹ Meeting of the Surgical Society of Berlin, July 10, 1911.

² PROGRESSIVE MEDICINE, June, 1911, p. 126.

³ Zentralbl. f. Chir., 1911, p. 728.

I believed I would have to desist from my intention, and would have to content myself with the establishment of an artificial anus. But, nevertheless, before doing so, I introduced my hand through the peritoneal opening in order to acquire more definite knowledge regarding the attachment of the lowest part of the colon. I now came upon a very long and movable sigmoid loop, which I brought out through the peritoneal opening. After determining that this loop could be brought down far beyond the anal opening without the slightest tension, I decided to use the entire loop as a substitute for the rectum. Further mobilization of the upper part of the pelvic colon was desisted from, and the rectum was divided high up between two ligatures. The upper end was invaginated and buried beneath Lembert stitches without difficulty. The remaining portion (which was involved by the tumor) was completely freed down to the sphincter, and was removed, together

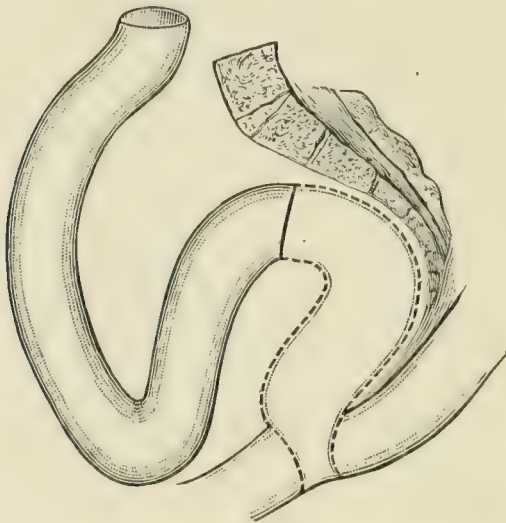


FIG. 43

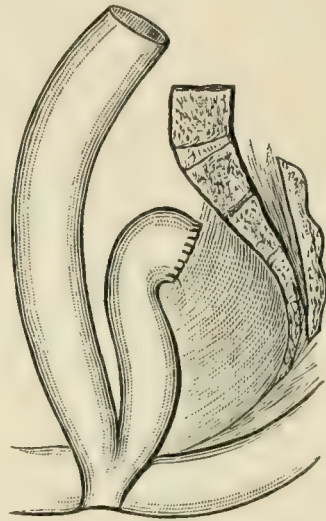


FIG. 44

with the mucous membrane of the anus. Now the summit of the sigmoid loop was brought through the anal aperture and fastened to the skin by a few stitches (as shown in Figs. 43 and 44), after which the wound was closed in the usual manner and the intestine opened where it protruded through the anal ring. The postoperative course was smooth, the wound closed with unusual rapidity, and defecation occurred through the continent anus.

“Inasmuch as, by the method just described, the mesentery of the intestine which is brought down, remains absolutely intact, the danger of gangrene can be avoided with certainty. Besides, this procedure is far more simple and convenient than the methods heretofore employed in mobilizing and bringing down the intestine. Also, the conditions for wound healing seem to be favorably influenced by the bringing down of extensive peritoneal surfaces.

“Theoretically, it might be objected that the blind loop of gut

might give rise to some disturbance should it become filled with intestinal contents. In the case just described, repeated examinations always showed the blind loop of gut empty and collapsed. Nevertheless, further experience will be necessary to decide this point definitely. In any case, I hardly believe that genuine danger from this cause can occur, if invagination of the blind end is carefully done.

"The question remains, whether the sigmoid loop is always of sufficient length to reach the anal opening without tension. At my request, Professors E. A. Homen and A. Wallgren, of the Pathological Institute of Helsingfors, were kind enough to investigate this point in a series of (up to now) 22 autopsies. In 19 of these, the sigmoid was of adequate length, while, in 3, inflammation of the sigmoid's mesentery had caused such shrinkage, that it was impossible to bring the loop sufficiently far down. At any rate it seems that, judging from this series of observations, the method of pulling down the intestine is frequently feasible.

"With preceding observations as a basis, I should like to recommend the following procedure for operations upon carcinomata of the middle or upper rectum: After exposing the rectum, by one of the usual dorsal methods, and freeing it from the anus up to the pelvic colon, an opening in the peritoneum is made, through which the hand is introduced. The sigmoid loop is pulled out of the abdominal cavity to determine whether its length is adequate to reach well below the anal opening without tension. If this proves to be the case, further mobilization of the upper rectum is desisted from. The gut is then divided as high up as possible, and the oral end is closed. The affected segment of rectum is extirpated, and the summit of the sigmoid loop is then anastomosed with the anal portion of the rectum. This can be accomplished by a number of methods. It seems best, however, to remove the anal mucous membrane and to pull the loop of sigmoid through the denuded sphincter in order that it may be opened after being sewed to the edges of the skin.

"This method may also be useful in carcinomata lying in the uppermost part of the rectum, which have to be operated upon by the 'combined method.' It may be preferable even where, after methodical ligation of the mesenteric vessels, the lower end of the gut could otherwise be sufficiently mobilized to bring it out through the anal opening without danger of gangrene" (Krogius' method being simpler, shorter, and safer).

"Lastly, as regards those cases where the sigmoid is too short for this procedure, an artificial anus will, in the majority of instances, have to be established. But even here, with the conditions otherwise favorable, it might be possible to reestablish the anal aperture in the normal place by utilizing a loop of small intestine in the manner just described. I have imagined the details of such a procedure to be as follows: Through the laparotomy wound, such a loop of the lowermost

ileum is found which will reach to the anal opening without tension. This loop is then excluded and the continuity of the small intestine is reestablished (end-to-end anastomosis). One end of the excluded loop is closed blindly and the other end is anastomosed with the lower end of the colon. The summit of this loop of small intestine is then brought down through the anal ring and opened here. In this manner it might be possible to establish communication between the colon and the anal opening and even after the ablation of the entire rectum sigmoid flexure. Fig. 45 shows a schematic representation of this operation which so far I have not employed upon the living, and have, therefore, made but short reference to in this connection."

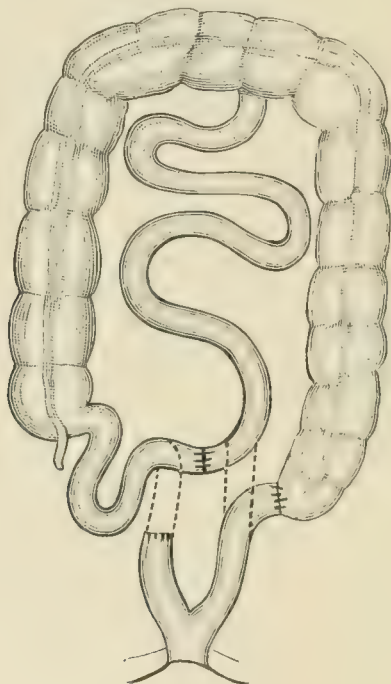


FIG. 45

In the course of a report on restoration of continence after amputation of the rectum, Rotter¹ states that he had recently employed Krogus' method in 5 cases. In only 1 instance was there a good result. So far, it was exceptional to find a sigmoid long enough to reach the anus. However, the method was used in 4 cases where a stump of rectum had been left, 2 healed smoothly; in 2, the suture lines parted because some periproctitic connective tissue had been inadvertently included between the sutured surfaces—such an accident can be avoided by more careful dissection. Rotter anticipates good results from the method.

Obliteration of the Rectum after Establishment of an Artificial Anus.²
At a meeting of the Physicians of the Charité, in Berlin, in May,

¹ Meeting of Freie Vereinig. d. Chir., Berlin, December 11, 1911.

² Deut. med. Woch., November 30, 1911, p. 2259.

1911, Kaiserling showed a specimen obtained from a patient who had supposedly suffered from carcinoma of the rectum, and who lived five years after operation. The entire intestine was obliterated, from the point in the sigmoid flexure where the fistula had been established, down to the anus. It was not possible to determine whether the original disease was either syphilis or gonorrhea.

In discussion, Hildebrand cited an analogous observation upon the living. A ventral hernia developed about twelve years after the establishment of a fecal fistula for stricture of the rectum. It became

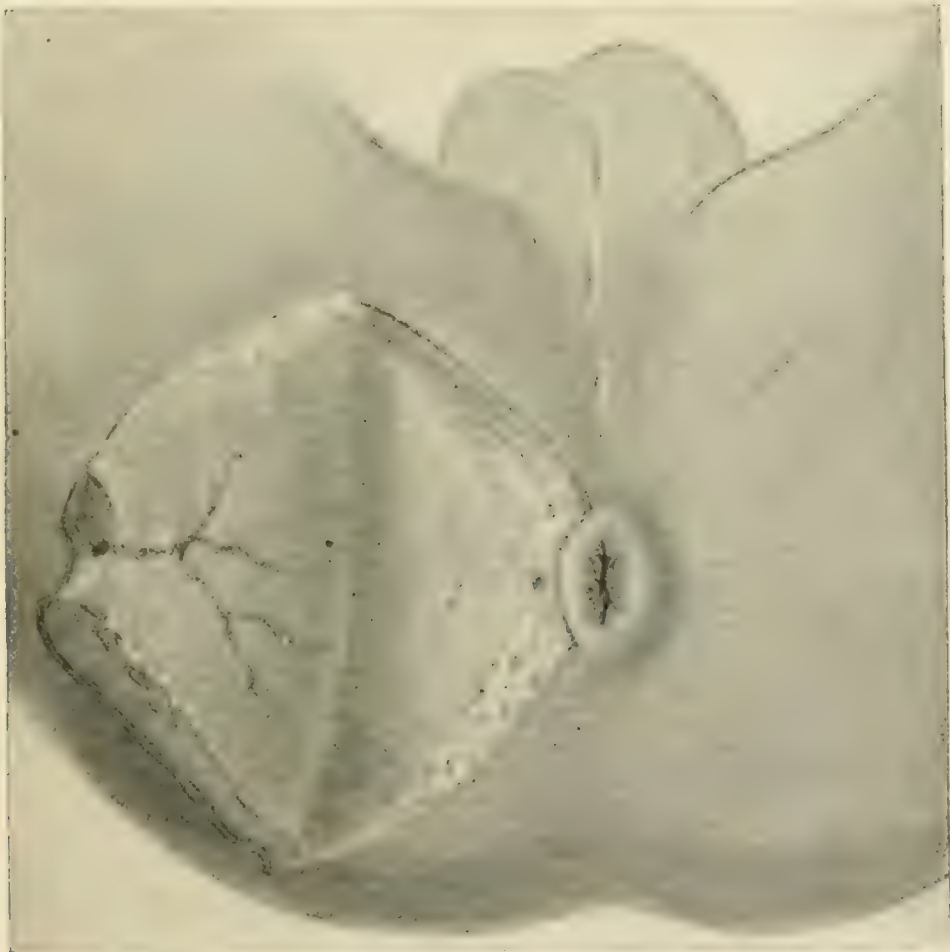


FIG. 46.—Trap-door flap lifted and fistula with all its branches reflected in the flap. Scheme of extirpation and approach to the outside of the rectal opening of the fistula. (Mackenzie.)

necessary to correct the disorder. At operation, the entire rectum and lower part of the sigmoid flexure were found to be completely obliterated. A sound could not be introduced from below. In this case, also, it was impossible to tell the original nature of the trouble.

Demon¹ establishes a cecal fistula in syphilitic strictures of the rectum because the extirpation of such strictures is mostly impossible, besides, the descending colon is frequently the seat of similar lesions.

¹ French Surgical Congress, August, 1911

The Surgical Treatment of Fistula in Ano is described by Mackenzie,¹ as follows: "After dilatation of the sphincter, the internal orifice of the fistula is examined and very cautiously dilated. Its circumference is then trimmed, and, if need be, the tract is split in the direction of the sphincter. The muscular layer is now closed with a few interrupted sutures of iodine catgut, introduced at right angles to the sphincter. The mucous membrane is then sutured with interrupted catgut or silk sutures. After this a skin flap is made on the involved side, beginning with a small, semilunar incision, just beyond the border of the external sphincter, dividing the parts down to the fistulous tract, the latter being

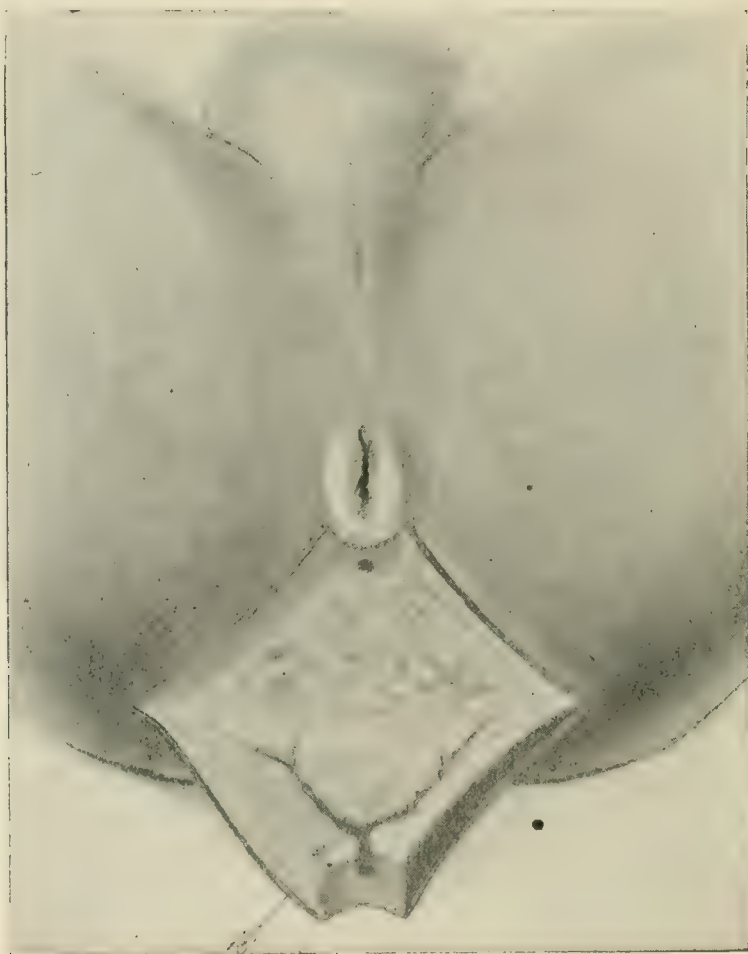


FIG. 47.—Flap reflected with contained fistulous tract, preparatory to extirpation. (Mackenzie.)

divided flush at its point of emergence from the bowel. The incision is then extended outward radially from both ends of this semilunar incision, to include, if possible, all visible and accessible branching tracts. It may sometimes be necessary to lift one or other of the buttocks in its entirety by this means. If the opposite side of the rectal opening is also affected, the same procedure is carried out there

¹ *Annals of Surgery*, September, 1911, p. 360.

too. The entire fistulous zone, including every branching tract in this reflected flap of tissue, is extirpated. The whole field is then cleansed, deep sutures are passed in order to close all dead spaces, and the skin is closed. A small drain may be left in for twenty-four to forty-eight hours. Figs. 46 and 47 show reflected flaps dealing with fistulous tracts, situated laterally and posteriorly to the anal orifice.

A New Method for Treating Prolapse of the Rectum in Women is a surgical gem (!) reported by Hoffman,¹ His patient was a woman, aged seventy years, with extensive prolapse of rectum and vagina. He first introduced a large, celluloid, ring-pessary into the vagina; then a similar one into the rectum, so that both prolapses were completely reduced. Now he united the two pessaries by silver wire which passed through the rectovaginal septum; and finally wound up the performance by attaching the rectal pessary to the sacrum by some more silver wire. The wire knot was buried under the skin. To cap the climax, a last silver wire suture surrounded the sphincter ani subcutaneously. Recovery from this was reported without complications.

THE LIVER

Cholangitis. The recent article by Naunyn² on this subject, is a most important contribution because of the suggestive ideas advanced which may have great influence in modifying and extending the present treatment of diseases of the liver and bile passages.

In the following review, by "cholangitis" will be meant, disease of the entire system of the bile passages, both large and small, including the gall-bladder. Only cholangitis of infectious origin will be considered. "The essential factor in every infectious cholangitis is infection of the bile in the bile passages, and this alone suffices." A cholangitis can reach the summit of its development as a typical, extremely dangerous disease, without becoming purulent and without necessarily showing marked changes of the walls of the bile passages, just as experimental infection of the bile passages by colon bacilli kills the animals without such changes. Suppuration in the bile passages, catarrhal and suppurative inflammation of the mucous membrane, ulcerations of the mucous membrane, and hemorrhages, are, in general, the result of infection of the bile, as are also liver necroses, or liver abscesses, which follow an invasion of the adjacent liver tissue by the inflammatory process involving the smallest bile passages. Infection of the bile is the primary factor in all these conditions; even before that, the essential, primary factor of the whole process is the presence of bacteria in the

¹ Münch. med. Woch., 1911, No. 20.

² Deut. med. Woch., 1911, No. 44, p. 2017.

bile. A distinction must be made between the presence of bacteria in the bile (bactericholia), and infection of the bile. For, although in typhoid and in cholera the specific organisms are present in the bile, they do not cause any actual trouble there, and, inasmuch as a few colon bacilli are regularly present in the bile of healthy individuals, nevertheless it is evident that such a "bactericholia" constitutes no infection of the bile. Therefore, according to Naunyn, only when local or general trouble results from the presence of bacteria in the bile, can one speak of infection of the bile. Through the study of cholelithiasis we have learned to recognize the colon bacillus as the most important infecting organism in this condition; and today the colon bacillus is, according to Naunyn, chief among the infecting organisms in cholangitis. In man, it is constantly present in the bile. At least it is rarely absent from the duodenal portion of the common duct, and as long as the bile stream suffers no obstruction to its passage, this organism remains harmless. However, if stagnation occurs for any time, there is immediate danger that the bacilli rapidly increase and thus set up infection. In this manner the colon infections occur in cholelithiasis. Moreover, it is not necessary that the bile stream be completely interrupted—any degree of stagnation is sufficient. Naturally, stagnation occurs most easily in the gall-bladder.

The best example of hematogenous cholangitis is infection of the bile in typhoid fever. As is well known, the typhoid bacilli may remain in the bile for years without causing any trouble to their host. Knowledge of this fact has led to the modern treatment of typhoid carriers. At times, however, typhoid bacilli in the gall-bladder may cause serious trouble, either by setting up a cholangitis, or by leading to the formation of gallstones. Again, secondary infections may be added to the primary typhoid infection; thus, ascending colon infections and secondary invasions by streptococci or staphylococci are not rare.

We now come to a consideration of the *symptoms* of cholangitis. Naunyn says it was the study of cholangitis calculosa (cholelithiasis) which has taught us the clinical picture of so-called gallstone attacks, and which has furnished us the best material for our studies of non-calculous cholangitis. Formerly, the typical feature of gallstone disease was considered to be an attack of *pain*, etc., resulting from impaction of stone. This was considered to occur far more frequently than cholangitis. Naunyn states that, while attacks of simple impaction of gallstones occur, they are rare. Even the characteristic, intense pains, which were formerly looked upon as typical of stone impaction, occur in cholangitis without any impacted stone, and the longer we consider all the other symptoms of so-called gallstone attacks, the more must they be attributed to the accompanying cholangitis rather than to actual impaction of stones. These symptoms which Naunyn believes typical of cholangitis rather than of stone are, the icterus

in most instances, while enlargement of the liver and gall-bladder, and fever must invariably be considered as typical signs of cholangitis.

As regards *icterus*, the old view that icterus in cholelithiasis results from obstruction of the common duct by stone, is, for Naunyn's conception of a gallstone attack, absolutely inharmonious. As regards the chronic icterus of cholelithiasis, such a conception may be correct, in that stronger, more intense chronic jaundice frequently is caused by obstruction of the common duct; but in acute gallstone attacks this condition plays no part, and although even here at times a common duct stone may be the cause of jaundice; nevertheless we find jaundice often enough with stone in the neck of the gall-bladder, and commonly find it absent with stone in the common duct. In an acute gallstone attack, one can usually attribute the icterus to cholangitis, even when it is quite intense. Naturally, a constant relation between the two does not exist; jaundice is often absent in severe cholangitis and may be present in its lighter attacks. Stoppage of the finer bile passages by bile thrombi is considered by Naunyn as the likeliest theory regarding the actual cause of jaundice. Again, "the chief cause of icterus in cholangitis is the cholangiolitis," *i. e.*, inflammation with its attendant swelling of the bile capillaries.

Even if there is not anything like unanimity at present about the etiology of jaundice, and even if one cannot agree with Naunyn's views in this particular, nevertheless, the entire conception of cholangitis as depicted by this veteran clinician, contains too much valuable suggestion to be set aside.

Fever, in acute gallstone attacks, is always due to cholangitis. It plays a similar role to that of jaundice; it may be absent, it may be very intense.

Painful Swelling of the Liver and of the Gall-bladder also belong to the symptoms of cholangitis. Both of these conditions are inflammatory and not the result of biliary stasis. This is shown by their rapid coming and going, independent of icterus.

In short, these main symptoms of acute gallstone attacks constitute the picture of a typical, severe, infectious cholangitis. Further, cholelithiasis has taught us to recognize the atypical cases which are common enough in it, while in the non-calculous forms these atypical cases constitute a majority. First are the light cases, in which no one symptom comes to a full development. Further, more severe cases in which a single symptom or symptom-complex predominates—at one time it is the icterus, at others, fever with general infection. Again, there are cases in which not only the local symptoms—those referable to the liver and pain—remain in the background, but fever also is absent, and only a severe grade of anemia and cachexia is evident. Such cases will again be referred to shortly.

NON-CALCULOUS FORMS OF CHOLANGITIS will now occupy our attention. Of these, cholangitis in cirrhosis of the liver, in general infections, and lastly idiopathic cholangitis, will be considered in turn.

Cholangitis in Cirrhosis of the Liver occurs more frequently in the hypertrophic biliary forms of the disease. In many instances this complication is not to be mistaken; distinct acute attacks strongly resembling gallstone attacks in which fever is almost always present, at times high, and accompanied by marked general prostration, have been observed. Indeed, the fatal ending of such cases is not to be attributed to a cirrhosis, but to the complicating cholangitis. Usually, however, the cholangitis does not occur in such decided attacks, but instead, increase of icterus, and painful enlargement of the previously not enlarged liver, may occur; such symptoms are not characteristic, they occur in cirrhosis also. Nevertheless, a sudden increase and as sudden cessation within a few days, gives a rather good general picture of cholangitis. What betrays the presence of cholangitis is the fever. Indeed, a fever which cannot be explained by any evident organic trouble may be due to a cholangitis complicating an undiagnosed cirrhosis.

Cholangitis in General Infection has already been spoken of in the discussion of typhoid cholangitis. In other instances, cases of "cholangitis without gallstones" have occurred. In these, their similarity to gallstone attacks is readily apparent. On the other hand, as already remarked, the idiopathic cholangitis runs an atypical course just as the calculous form and the cholangitis in cirrhosis do. Naturally, it is difficult to make a diagnosis in such cases, and still more difficult to prove such a diagnosis correct. This Naunyn readily concedes. Thus the affection may take the form of a remittent or intermittent fever, or of a typhoid condition, or a sepsis, perhaps a septic endocarditis, or, in contradistinction to these, a feverless anemia, in all of which conditions, the specific liver symptoms play no prominent part. As just said, the diagnosis of such conditions is most difficult, even when the presence of gallstone or of cirrhosis or of a previous attack of typhoid are known, and when such facts are absent, the supposition of infectious cholangitis in such cases is often a daring diagnostic risk.

We shall now speak of *idiopathic icterus*, including all forms from the lightest catarrhal jaundice to the severest form of Weil's disease. In this consideration it must be remembered that the terms jaundice and cholangitis do not cover one another. Cholangitis exists without icterus, and therefore the conception of cholangitis is a far more comprehensive one than that of icterus.

Many of the specific organisms in *acute infections* invade the bile. Among these are the staphylococci, streptococci, pneumococci, colon, influenza, typhoid, cholera, and pest bacilli. Naturally, the varying strength of individual bacterial strains and the varying degrees of indi-

vidual resistance play their part as in all infections. The more virulent an infecting bacterial strain is, the more rapidly does it invade the bile passages; this is shown by the frequent occurrence of cholangitis as a complication in the severest types of infection in man. Naturally, previous disease of the biliary system favors such invasion. Of the pathogenic organisms referred to above, certain forms flourish better than others in the bile. Thus, typhoid, cholera, and pest bacilli and staphylococci seem more able to maintain themselves under these conditions than pneumococci. Authentic cases are on record of cholangitis or cholecystitis due to infection by the above-named forms. Whether the icterus of the acute infectious diseases is due solely to a complicating cholangitis is a question. However, the recognition of cholangitis as a complication of severe infections, and as a cause of the icterus in these, is a concept which is steadily gaining ground. Typhoid, influenza, and cholera are three diseases in which this seems to have been proved, while the idea of cholangitis as a cause for the jaundice of general sepsis from staphylococci, streptococci, and colon bacilli, and even of pneumonia, is steadily gaining ground.

As regards *catarrhal jaundice*, Naunyn believes it should be supplanted by the word *cholangitis*, and, all in all, he wonders whether it would not be worth while to place idiopathic cholangitis (catarrhal jaundice) among the infectious diseases. In the previously mentioned consideration of various types of cholangitis, the varied and indefinite character of the course of the malady was emphasized, and there seems to be no reason why these irregularities should not be present in that form of cholangitis which, up to now has been called catarrhal jaundice. And lastly, the jaundice should be looked upon as a disease of the bile passages, according to Naunyn. The longer he considers it, the more doubtful does it seem whether any other type of icterus exists, except that due to resorption of bile from the bile passages. Obstruction of the smallest of the bile passages plays the chief role, and, further, destruction of their walls may be cause for transit of the bile into the lymph passages, and lastly, inflammatory changes in the mucosa seems to make it passable for bile. Naunyn closes his remarks about catarrhal icterus by advising that it be called *primary infectious cholangitis*.

Among the causes of icterus due to compression of the bile passages are neoplasms, echinococcus cysts, and the like. Here, too, stasis leads to infection, so that cholangitis cannot be excluded in such conditions.

Lastly come the febrile forms of syphilis of the liver in the late stages of the disease. In some of these, the clinical picture would indicate a cholangitis. Inasmuch as invasion of the bile passages by the *Spirochete pallida* has not been proved as yet, Naunyn is inclined to believe that the possible cholangitis is a result of the secondary stagnation due to compression of the bile passages or affection of their

walls as a result of specific lesions. More than twenty-five years ago the jaundice in early syphilis was looked upon as a sign of specific cholangitis by a French author, and, according to recent investigations, this seems likely of substantiation.

As regards therapy, Naunyn speaks of the possible value of a temporary biliary fistula as the surgical measure which might be indicated in such conditions.

It is interesting to see how the two cases of "ACUTE HEPATITIS SIMULATING STONE IN THE COMMON DUCT AND LIVER ABSCESS," reported by Churchman,¹ fit into the picture of "cholangitis" drawn by Naunyn.

The briefest summary of essential features in the first case is as follows: "Weakness and loss of appetite, with vague abdominal pains for two years; jaundice and cough for three weeks; diurnal and bi-daily chills (97.5° to 106.5°), with sweats and some pain in the right side; complete obstructive jaundice, unchanging in degree; enlarged, slightly tender liver; some nausea; negative Wassermann and Widal; purpura of the ankles; no malarial parasites. At autopsy, gall-bladder and ducts normal; no stones; liver enlarged; moderate degree cirrhosis with diffuse necrosis of the parenchyma; no organisms (smear, sections, and blood culture); no syphilis."

A palliative drainage of the gall-bladder was done to relieve, if possible, the symptoms due in part to infection of the bile passages. The downhill course was uninfluenced by operation, and the patient died two days later.

In Churchman's second case there was dull pain in the right hypochondrium, enlarged liver which was tender, slight jaundice, and fever. The Wassermann reaction was positive; Widal reaction and blood culture negative. At operation, the liver was thoroughly explored with a needle but no pus encountered. During ten days following operation, extreme weakness, profuse perspiration with some distention were present. Death occurred in extreme prostration. Autopsy showed syphilitic aortitis; gall-bladder and ducts normal, no stones; diffuse cirrhosis of the liver and necrosis; no abscess.

In discussing the cases it was remarked that "the character of the temperature suggested an infectious origin, but blood cultures were negative, and no organisms could be found either in smears from the liver or in sections. The failure to obtain positive cultures from the liver has, however, only relative value." Here the work of Babes was quoted in which it was stated that where animals with experimental streptococcus septicemia lived longer than eight days after the injection, the organism could not be cultivated from the degenerated internal organs. Although the smears and cultures were negative in his cases, Churchman writes: "Nor did the absence of signs of suppuration in

¹ *Annals of Surgery*, June, 1911, p. 783.

the liver exclude infection, for the observation has been repeatedly made that organisms in large quantities may produce destructive parenchymatous lesions without the usual suppurative changes.

"The cases here reported illustrate the importance of a grave, acute disease associated with enlargement of the liver, some increase in the connective-tissue elements and a high grade of parenchymatous degeneration. The symptoms produced are jaundice, complete or nearly complete absence of bile pigment from the stool, fever, like that seen in common duct stone or in liver abscess, and manifestations of profound intoxication. Although the clinical picture suggests a bacterial origin, none could be demonstrated.

"*Icterus gravis primitius* describes, though somewhat vaguely, the clinical picture and takes account of the absence of demonstrable cause. *Degenerative productive hepatitis* with enlargement indicates the many lesions and correctly emphasizes the element of destruction. Both names rightly imply the existence of an acute disease of the liver distinct from acute cloudy swelling, acute yellow atrophy, suppurative cholangitis, and liver abscess. The fact of the existence of such a disease is of more importance than its name; and its resemblance to liver abscess or stone in the common duct is of some importance in diagnosis."

X-rays in Diagnosis. According to Clairmont and Haudek, the *x*-ray is of practically no use in diagnosing *gallstones*. Very exceptionally, gallstones may contain a sufficient amount of calcium, to cast shadows; examples of this have recently been reported by Pfahler and de Quervain.

Subphrenic Gas Abscess Revealed by the X-ray, is reported by Reineck.¹ The abscess was secondary to acute gangrenous appendicitis. The radiograph showed, on the right, immediately beneath the arc of the diaphragm (which was seen as a thin line), a light semilunar zone almost as transparent as the lung. Beneath this a similar dark zone, the boundary of which against the light zone consisted in a straight level margin. This horizontal line showed a definite wave-like motion on shaking the patient before the fluoroscope.

Vegas y Jorge² reports similar *x*-ray findings with infected gas-containing *echinococcus cysts of the liver*.

Regnault³ reported a case of liver abscess in which fluoroscopy revealed the abscess perforating the diaphragm in the shape of a collar button.

¹ Fortschr. a. d. Geb. d. Röntgenstrahlen, Band xvi, Heft 6.

² Cit. after Zentralbl. f. Chir., 1911, p. 1468.

³ French Surgical Congress, 1911.

THE PANCREAS

Acute Pancreatitis. THE PATHOGENESIS OF ACUTE PANCREATITIS. Pólya¹ believes, as the result of extensive experimental research, that trypsin is able to induce acute disease of the pancreas, but that its antecedent substance trypsinogen, is harmless. Only when trypsinogen is activated and thus transformed into trypsin does harm result. Further, Pólya believes that his experiments prove bacteria able to induce such activation. This result bears upon both the ferment theory and the parasitic theory regarding the etiology of acute pancreatitis.

THE SURGICAL TREATMENT OF ACUTE PANCREATITIS, as practised at present is well illustrated in the article of Körte.² This communication is replete with useful observations and logical deductions, but its arrangement is extremely poor. The labor of arranging facts presented in a paper, should fall on the author, not on his readers. The English translation is extremely poor and lacks the expressive quality of the German original which appears in the *Archiv für klinische Chirurgie*.

Körte enumerates the following pathological types of acute pancreatic inflammation: Acute inflammation with bloody and serous infiltration, of which the lighter grades either disappear or go on to a chronic form; severer grades, marked by a profuse hemorrhagic infiltration of the tissue with death of larger or smaller portions of the gland; indeed, necrosis of the entire gland has been noted at times; still severer grades of inflammation than the foregoing, are marked by a free outpouring of blood which, in some cases, may go on to sudden death, in others, to necrosis of the gland.

Necrosis of the pancreas is usually accompanied by pus formation. However, in rare instances, an omental pseudocyst containing pieces of necrotic tissue is found. Where pus has formed, it may point in a number of directions; either it may remain retroperitoneal and burrow toward the flank, more frequently the left than the right, or it may rupture through the peritoneum overlying the pancreas, and invade the omental bursa forming a subphrenic abscess.

Körte makes a distinction between the forms of acute hemorrhagic pancreatitis just described, in which bacterial invasion is secondary to the hemorrhage, and a "purulent form of pancreatitis which finds its etiological factor in the infection carried from the intestines or from the bile passages through the papilla of Vater, or the inflammation caused by infection conveyed through the lymphatics." (Compare this view with that of Pólya in the review just preceding this.)

¹ Mitt. a. d. Grenzgeb. d. Med. u. Chir., Band xxiv, Heft 1.

² Annals of Surgery, 1912, p. 23.

The Rate of Inflammatory Change varies. Thus necrosis has been found as early as the third or fourth day, and, again, cases operated upon in the third week have shown only inflammation. Inflammatory pseudocysts have been found in different parts of the gland, likewise, the location of necrotic foci was variable.

Conditions found co-existing with pancreatitis: duodenal ulcer in 3 cases; gallstones in 22 out of 44 cases (50 per cent.) (operation or autopsy).

Since the various forms of inflammation are not sharply defined, but run over into one another, it seemed best only to consider the condition of acute pancreatitis. By this term are included all kinds of inflammation and their sequelæ.

The Symptoms frequently show previous attacks of pain, similar to but not as severe as, the one which brought the patients to the surgeon. Perhaps the only characteristic thing about acute pancreatitic attacks is the intense and extremely sudden onset of epigastric pain, accompanied by greater shock than one usually sees in other conditions causing pain in this region. In other cases the onset is gradual, the symptoms taking a number of days to reach full development. Pancreatitis is frequently found at operation for supposed acute gallstone disease, and, indeed, in a great many cases (50 per cent.) the two conditions co-exist. At times symptoms of apparent intestinal obstruction are revealed by operation as due to an acute pancreatitis. Besides these, the causative pancreatitis has been demonstrated at laparotomy for supposed perforated gastric ulcer or acute appendicitis. Sugar in the urine is rarely found. When present, it may furnish a valuable hint. The Cammidge reaction is too unreliable to be of diagnostic value.

“At the present time *the diagnosis before operation* can only be made with probability, owing to the lack of sufficient pathognomonic signs.” Nevertheless, the indications for surgical interference are clear, because of the symptoms of active peritoneal trouble in the epigastric region. Since noting a “number of cases having typical symptoms of epigastric peritonitis with subsequent inflammatory swelling posteriorly, particularly in the left lumbar region,” Körte considers this, possibly the most certain sign which offers itself for the diagnosis of acute pancreatitis. However, it is a late symptom analogous to the abscess state of acute appendicitis.

The prognosis is largely affected by the condition of the pancreas as revealed at laparotomy. Thus the cases with necrosis found as early as the third or fourth day, have a very bad outlook. Again, it will make a great difference in the prognosis, whether simple necrosis exists, or necrosis with pus formation. For example, of 21 cases in which there was inflammation, or pus formation but no necrosis of the gland, 16 recovered, 5 died; while in 13 cases with necrosis with pus

in the omental bursa, or in the retroperitoneal tissues, there were 11 deaths and 2 recoveries. From this it was concluded that operations undertaken in the early inflammatory stages of pancreatitis offered a much better prognosis than those undertaken after necrosis had set in.

Besides this, *operative indications* by Körte are based on the fact that whereas, of 16 cases operated upon in the first two weeks, 11 recovered, of 14 operated upon in the third and fourth weeks, only one-half were saved. Körte says: "We feel justified in emphasizing the fact that the very earliest moment should be employed for operation, since it appears that the greater proportion of these cases offered more opportunity of recovery in which the inflammatory hemorrhagic infiltrated gland was freely exposed and incised early, rather than those which came to operation in the stages of necrosis."

Operative Procedure. Incision. Usually a median epigastric incision is made. After opening the abdomen the presence of fat necrosis is an absolute indication for exposure of the pancreas in order to ascertain its actual condition. There are three routes of approach, (1) through the gastrocolic ligament (below the stomach); here after division of the ligament, the head of the pancreas is found in the duodenal angle; (2) through the lesser omentum (above the stomach), this route is less frequently used; (3) by dividing the peritoneum to the outer side of the duodenum and retracting the duodenum inward, thus giving access to the back of the head of the pancreas; this route was used by Körte for drainage in one case; in another, all three methods were employed to expose and drain the acutely diseased gland.

Another possible approach to the pancreas is through the transverse mesocolon. Such a route is not a good one because of the great vessels running in this structure, and because of the possibility of infecting the lower abdominal cavity. The use of this route in chronic pancreatitis will be referred to elsewhere.

When the inflammation is unquestionably on the left, in the neighborhood of the tail of the gland, in order to obtain proper exposure, one must make a secondary longitudinal incision on the left side, or a left-sided transverse incision after the method of Sprengel.

Körte also speaks of reaching the pancreas by strongly retracting the semitransverse gall-bladder incision so frequently used in Germany.

The gall-bladder should always be examined in every case of pancreatitis and, *vice versa*, in every operation upon the bile passages, the pancreas should be inspected. (Pancreatitis cases are often enough operated upon under the diagnosis of acute gallstone disease.)

During the stage of collapse, one must be contented with merely draining the bile passages; no radical extirpation of the gall-bladder should be attempted at such a time.

The lumbar incision is particularly indicated where pus has invaded the retroperitoneal fat, and is pointing in the left lumbar region. A

transverse incision is made beneath the twelfth rib. The muscle is separated and the underlying necrotic retroperitoneal fatty tissue is exposed. Blunt dissection is made at the lower pole of the left kidney upward and inward toward the tail of the pancreas until the retroperitoneal pus cavity is opened and drained. The disadvantage of this approach lies in the inability to observe the actual conditions present.

As regards the treatment of the pancreas itself, using the anterior abdominal approach, in severe hemorrhagic infiltration, the question is, whether to drain merely the surface of the gland, or to drain the body of the gland itself, by breaking through the peritoneal covering and opening into its substance with a sound or other blunt instrument, and using tubes or gauze strips for drainage. Körte believes that, by employing the latter method, "the inflammation may be modified and the actual necrosis anticipated." He concedes, however, that statistics on this point are not large enough to permit drawing absolute conclusions. In 7 cases treated by this latter method, 5 recovered, 2 died. In those who recovered, small pieces of the gland were thrown off; there were no evidences of extensive gangrene.

In the presence of necrosis with pus formation, the results, in cases operated upon through the abdominal incision, were uniformly bad; all the patients died. The lumbar method gave better results. Of 7 cases, 5 patients died and 2 recovered. In 3 of the fatal cases, death was due to secondary hemorrhage while the patients were really convalescent from their inflammatory condition.

Körte's statistics are as follows: He collected 44 cases, 38 of which were operated upon; in 4 of these 38 cases, the gland was not directly attacked, nor was any "safety valve opening of the gall-bladder done." In the remaining 34 cases, the gland tissue was directly drained. Eighteen of these patients recovered, 16 died.

If classified in a different way, we find 21 patients operated upon by the abdominal route. Those with acute inflammation did well (14 recoveries, 2 deaths). Those with pus did badly (5 cases)—all were fatal. Thirteen patients were operated upon by the lumbar route (4 lived and 9 died), all representing late cases with bad prognosis.

Postoperative Complications. There were 4 instances of pancreatic fistula, all healed eventually. The Pawlow-Wohlegemuth diet did not seem to influence their course very much, nevertheless Körte advises its employment.

Postoperative hemorrhage was the most serious complication. Out of 7 cases, 6 were immediately fatal. In only one was tamponing effectual. Erosion of the splenic artery was found to be the cause of hemorrhages in 4 instances. Of the 7, 4 were operated on by the lumbar route and 2 through an abdominal incision. In 1 instance, the hemorrhage took place into the duodenum. The earliest of these hemorrhages occurred eleven days, the latest thirty-four days after the operation.

To sum up, Körte advises early operation through an abdominal incision, exposure of the pancreas and drainage of the gland through openings made with a blunt instrument. The gall-bladder and common duct must be examined in every case.

In late cases with pus formation, the anterior route is absolutely contraindicated, the lumbar or transpleural is the only proper route by which retroperitoneal abscesses in this region should be drained.

Secondary arterial hemorrhage is a grave and not very rare complication in acute pancreatitis.

Unoperated, it seems reasonable to suppose that mild cases of acute pancreatitis recover; that mild attacks often precede severer ones; that most unoperated cases die in the acute stage and rarely live to reach the purulent or necrotic stage.

An early operation, according to Körte, is apparently such an one as is done within the first week or two after the onset of the trouble.

Chronic Pancreatitis. During the last year nothing very new has come to view about chronic inflammation of the pancreas. What has been published emphasizes facts already well known, namely, that disease of the pancreas, chronic as well as acute, is frequently associated with disease of the bile passages, hence in operation for either of these conditions, examination of the less prominently affected region is certainly indicated. Drainage of the bile passages by cholecystostomy, cholecystenterostomy or choledochostomy, is the usual method of relieving the chronically inflamed pancreas. Link¹ reports a case where the tail of the pancreas was exposed and raised from its bed, brought through an opening in the transverse mesocolon, and sutured into the abdominal wound. Then the tail was incised, and an opening into the pancreatic duct thereby established. The entire pancreas was filled with small calculi.

Kehr,² in discussing Körte's paper on pancreatitis, stated that he removes the gall-bladder to protect the pancreas from this source of bacterial infection, and drains the hepatic duct if a common duct stone has been present. He reported 50 cases of chronic pancreatitis with no gallstones in which he had performed cholecystogastrostomy; all had done well.

By "**Pancreas Annulaire**" is meant a ring-like growth of the head of the pancreas surrounding the descending portion of the duodenum. Lerat³ found this condition in a woman, aged forty-six years, who, as a child, suffered a great deal with vomiting. From sixteen to twenty-four she had stomach trouble, then enjoyed eight years of fair health, after which dyspepsia appeared again for a year. Thirteen years

¹ *Annals of Surgery*, June, 1911, p. 768.

² *Vers. Deut. Natur. u. Aerzte*, September, 1911.

³ *Bull. de l'acad. roy. de Méd. de Belg.*, vol. xxiv, No. 4, p. 290.

previously, nephropexy had been done for a supposedly prolapsed right kidney, without relief. Two years before coming to Lerat the gastric symptoms became more severe, pains came on two or three hours after every meal. A mucous colitis then developed. For the past three months the patient had lived on fluid diet; there was extreme emaciation. Lerat's diagnosis of the condition was chronic pancreatitis, cholecystitis, and chronic appendicitis. Laparotomy, January 4, 1910. The appendix and gall-bladder were removed. The descending portion of the duodenum was surrounded by a ring-like mass of pancreatic tissue. This ring had a diameter of 2 cm., was 1 cm. thick and 4 cm. long. It sprang from the anterior surface of the head of the pancreas, encircled the duodenum, and then joined the posterior surface of the head of the pancreas; it was resected. Microscopic examination showed chronic pancreatitis, a normal gall-bladder and chronic inflammation of the appendix.

This anomaly of the pancreas is very rare. It has been found four times at autopsy. Widal found the condition at laparotomy on a three days' old child, where, besides an annular pancreas, there was atrophy of the duodenum. Posterior gastroenterostomy was followed by recovery.

A few cases in which the ring was not quite complete (*pancréas à crochet*) have also been reported.

GYNECOLOGY

BY JOHN G. CLARK, M.D.

CANCER OF THE UTERUS

The Cancer Problem. This continues to occupy an immense amount of attention in the scientific world, and while no very decisive or startling new discovery can be recorded, an immense amount of data has been accumulated which cannot help bringing the question nearer to a solution. New societies are constantly being formed for its study, and old ones are extending their activities.

In January of last year, for instance, the Danish Committee for Cancer Research started a campaign by causing to be published, in almost all the daily papers of the country, an announcement regarding the curability of cancer if taken in time, the importance of consulting a physician upon the earliest appearance of any suspicious symptoms, the fallacy of believing that no cancer can be present in the absence of pain, etc. The Committee intends to publish similar announcements in the daily press every six months.¹

The Austrian Cancer Research Society has just completed its first year of existence, and has been taken under the personal protectorate of the Emperor Francis Joseph. The Society has over three hundred members, and an assured income of over \$4000 per year, in addition to which it has just received a bequest of \$25,000, which is to be used for the establishment of a cancer hospital. It is also undertaking the organization of a serological institute, in connection with one of the dermatological clinics, for the purpose of studying, thoroughly, some of the serological reactions which have been brought forward for the diagnosis of cancer.²

In Chile, a committee for cancer research has been formed during the past year, for the purpose of spreading knowledge concerning the disease throughout the Republic; and to render possible an early diagnosis of suspicious tumors by microscopic examination, free of charge, in the Pathologic Institute of the University; to collect statistics; and to hold monthly scientific meetings for the mutual exchange of ideas.

¹ *Cancer*, 1911, vol. iii, p. 56.

² *Journal of the American Medical Association*, 1911, lvii, 2151, and *Cancer*, 1911, iii, 54.

The Committee has joined the International Association for Cancer Research, whose headquarters are in Berlin.¹

Progress in Cancer Research. GROWTH OF CANCER CELLS ON CULTURE MEDIA. Great possibilities in this direction appear to be opened up by the brilliant work of Carrel and his associates, at the Rockefeller Institute² in the growing of tissue outside the body. These investigators have brought the technique to the point of perfection, that normal or malignant cells from human beings or animals, can be inoculated on blood serum, and cultivated with apparently as much certainty as is done in the case of the ordinary bacteria. The growth can be studied grossly and microscopically, the subcultures made, and animals re-inoculated from these, with the production of growths similar in nature, to the original tumor. One result of their investigations has been the demonstration that sarcoma cells will grow as vigorously in plasma from immune animals as in that from normal animals, thus affording further proof that specific cytolytic substances do not exist in the body fluids of animals which have been rendered immune to transplantable malignant growths.

CANCER IN LOWER ANIMALS. An editorial³ calls attention to the fact that comparative pathology is adding much valuable material for the understanding of the biology of cancer, since it is becoming well recognized that cancers, or growths closely resembling them, occur, not only in human beings, but in all vertebrates, even in cold-blooded animals, such as reptiles and fish. It is an interesting and suggestive fact that wild animals in captivity seem especially prone to malignant disease. An interesting case of this sort, reported recently, was that of a rhinoceros which succumbed to a typical carcinoma of the uterus.⁴

Much interest is being manifested in the investigation of the fish tumors, as was related in these pages last year, at which time President Taft asked for a large appropriation for their study. Considerable doubt upon the true carcinomatous nature of at least the majority of them, has, however, been expressed by some investigators, especially by Marine and Lenhart,⁵ who believe that they represent merely a form of goitre, brought on by keeping the fish herded together in tanks that are too small, and under other unfavorable circumstances. They admit, however, that carcinoma may occur in fish goitre about as frequently as it does in human goitre.

¹ Cancer, 1911, iii, 175.

² Carroll and Burrows, *Journal of Experimental Medicine*, 1911, xiii, 387; Lambert and Hanes, *Journal of the American Medical Association*, 1911, lvi, 33; *Journal of Experimental Medicine*, 1911, xiii, 505, and other papers.

³ *Journal of the American Medical Association*, 1911, lvi, 670.

⁴ Betke, *Frankfurter Zeit. f. Path.*, 1910, vi, 19.

⁵ *Journal of Experimental Medicine*, 1910, xii, 311 and 1911, xiii, 455.

CANCER IN PLANTS. Most instructive investigations of certain malignant growths of plants have been carried out by Dr. Erwin F. Smith,¹ who has found many striking points of similarity between crown-gall, a disease of certain plants, and human cancer. He has shown, by thousands of microscopic sections, that the proliferation of the tumor tissue greatly distorts and destroys the other tissues of the plant; well-marked metastases occur in parts of the plant removed from the original growth, as, for example, higher up on the stem, or in the leaves, the secondary growths having the exact nature of the primary ones. (One point of dissimilarity between these metastases and those of human cancer should be noted, however. In the case of plants, a continuous thread of tumor tissue can, in every case, be demonstrated, burrowing its way from the primary growth, through the substance of the stem, and finally cropping out to the surface again, at the point of the "metastasis.")

There are many other points of marked similarity—for instance, a certain degree of immunity against the growths can be obtained in plants by repeated inoculations; the disease tends to appear in callous or scar tissue, *i. e.*, in pruned roots, or at the junction of the stock and the graft; the galls show a marked tendency to recur after excision. Dr. Smith firmly believes that these tumors are of parasitic origin, and thinks the parallelism which they bear to human neoplasms may lend some weight to the theory of a parasitic origin of the latter.

Etiology of Cancer. **TRAUMA.** Coley² is a strong believer in the theory that, in many cases, a *single, acute trauma* may be responsible for the subsequent development of malignancy, and states that most of the authors who have combatted this assumption have based their opinions more upon the reports of others, and the literature, than upon personal observation. He reports, from personal observation, 970 cases of sarcoma, in 225 of which (23 per cent.) a definite history of preceding trauma was present; in over one-half, the tumor developed within the first month after the injury. In a series of 250 similarly observed carcinoma cases, a like history was present in 33 per cent.; 120 of these were breast carcinomata, in which trauma appeared as a factor in no less than 43 per cent. Although this apparently is a very high percentage, it is still lower than that reported from a somewhat smaller series of cases by McWilliams.³ Coley gives, in his article, a complete list of all the cases, with the age of the patient, character of the injury, and the time elapsing between the injury and the development of the tumor.

Falk⁴ has studied the question of the etiology of cancer of the cervix

¹ Bull. No. 213, Bureau of Plant Industry, U. S. Dept. of Agriculture.

² Annals of Surgery, 1911, liii, 449.

³ Medical News, April 28, 1900.

⁴ Zeit. f. Krebsforschung, 1911, x, 271.

uteri by reviewing many of the more important papers dealing with carcinoma statistics published in recent years, and comes to the decided conclusion that injuries to the cervix are the most important predisposing factors. All observers show a very small proportion of nulliparæ who have cervical carcinoma, and true instances of this disease in virgins are of the greatest rarity. In most of the papers examined, the average number of births for each patient was five or over.

BLASTOMYCETES OF LEOPOLD. A series of investigations of the possible parasitic etiology of cancer, which are certainly of great interest, and which, on account of the high scientific standing of their author, must be given serious consideration, whether or not one is in sympathy with his deductions, have been carried out by the late Professor Leopold,¹ of Dresden. For many years he has been studying fresh carcinoma tissue, and even ten years ago he was able to demonstrate therein certain living, moving organisms, which he took to be blastomycetes. In 4 cases, he was able to obtain the organisms in pure culture, to subculture them, and, in 3 cases, to produce malignant tumors by the injection of the cultures into rats. After the animals had perished as the result of the newgrowth, the same organisms were recovered in pure culture.²

At that time, however, he was able to obtain cultures in but a small percentage of the tumors examined, and he therefore set to work to perfect the technique of finding and culturing these parasites. The method employed by Leopold is briefly as follows: Only the youngest outposts of non-ulcerating carcinomata, or the very deepest ones of ulcerated specimens, far removed from the infected surface, are utilized. In many of these bits of tissue not a single coccus or saprophyte can be found. The tissue is handled and preserved throughout under absolutely sterile conditions. Immediately upon being removed at operation, it is placed in a sterile receptacle; it is handled only with sterile instruments, and cut only with sterile knives. If any bacteria develop during the period of examination, the specimen is discarded, though with careful technique this accident rarely happens.

Three general methods of examination are pursued: (1) Tiny scraps of tissue are suspended in a hanging drop of salt or sodium hydrate solution, sealed with vaseline, and preserved for days and months in the warm-stage microscope. (2) Small bits are cultured directly on acidified nutrient gelatin. (3) Scrapings, from the tissue to be examined, are placed in sterile 10 per cent. sugar solution in a fermentation flask, which is kept at room temperature in the dark, for eight to ten days, and are then cultured as above. By this method, there are seen in the hanging-drop preparations, little shining spheres with tiny buds or knobs, which may be compared to bright nickel coins.

¹ Arch. f. Gyn., 1910, xcii, 31.

² Ibid., 1900, lxi.

These objects show active motion; under very high power they are seen to be round or oval in shape, and to contain fine granules.

The percentage of cases in which the author was able to obtain pure cultures of the blastomycetes from tumor tissue has steadily increased, especially since the introduction of the sugar treatment, and in his last 22 consecutive cases, he was able to secure a culture in *every one*, or 100 per cent. He has also obtained cultures from many of the direct inoculations, without previous sugar-treatment, but not nearly so constantly.

He has found uterine, ovarian, and breast carcinomata especially well suited for these investigations, though he has also examined a few peritoneal carcinomata, two uterine sarcomata, and one rat tumor. As a control, he has examined tissue from various other sources, such as uterine myomata, and tuberculous glands, with negative results. He concludes from these investigations, that, even though one does not wish to draw any hasty conclusions regarding the etiology of malignant neoplasms, so striking a regularity in the occurrence of blastomycetes in such tumors indicates clearly that they cannot be considered as mere chance findings.

VITAL STATISTICS OF CANCER. A study of the etiology of cancer, from the statistical point of view, has been made by Werner,¹ who has examined the vital statistics of Baden for the past twenty-five years. He finds that the yearly number of cancer deaths has increased about one-third during this time. The increase reaches to as high as 50 to 60 per cent. in persons over sixty years of age, is very slight in those from forty to sixty, and there is no increase whatever shown in those under forty. Werner believes, therefore, that the apparent increase in the total deaths from this disease represents the true state of affairs, and is not due to better diagnosis, etc., because, in the event of the latter, the increase should affect all ages indifferently.

It is noticeable, also, that many districts show for years at a time an actual decrease in the number of cancer cases, whereas others show a marked increase, and others, again, great irregularity. The last mentioned are in the majority; frequently, a district will go along for six or eight years with a very low carcinoma mortality; it will then suddenly jump to a very high one for some years, and then again enjoy a long carcinoma-free interval. A study of the stable carcinoma-poor, and carcinoma-rich districts, shows them to be scattered promiscuously throughout the country, very frequently lying near together; the author was unable to discover any geological, hydrographic, or climatic characteristics which appeared to be etiological factors, nor did age, sex, social position, race, religion, occupation, diet, or character of the dwellings, show any direct relationship to the frequency of cancer.

¹ Münch. med. Woch., 1911, lviii, 2325.

Often the districts richest in cancer had a comparatively small percentage of inhabitants over fifty years of age, while those poorest in such cases, had a very high percentage of aged inhabitants, so that the difference in cancer mortality did not appear to depend upon a variation in the longevity of the different populations.

In practically all the districts, more than 50 per cent. of the cancer deaths were due to an involvement of the gastro-intestinal tract; no other organ showed anything like a similar preponderance. The author did not find any marked influence on the cancer mortality from occupation or blood relationship; neither has he found any evidence of direct transmission by contact from one individual to another. He thinks his investigations lend some weight to the parasitic theory of the origin of a great majority of malignant tumors.

GEOGRAPHICAL DISTRIBUTION OF CANCER. Bertillon¹ has made a somewhat similar statistical study concerning the occurrence of cancer in France. He has found that it is much more prevalent in the North than in the South; if one draws a square on the map of France, bounded on the north by the sea, on the other three sides by lines from Caen to Angers, from Angers to Dijon, and from Dijon to Mézières, it will be found that the region within this square is three to four times as much affected by carcinoma as all outside of it. Compare with it another square, whose northern boundary is from La Rochelle to St. Etienne, and thence to the Rhone; the area bounded by this line, the Rhone, the Pyrenees, and the two seas, is exceptionally free from cancer.

The figures on which these statements are based were those of 1906 to 1908; they were remarkably uniform during these years.

The area of high carcinoma mortality corresponds in a general way to the chalk-basin of which Paris is the centre, and also in a general way to the areas of greatest alcohol consumption, but it is not identical with either. The author thinks that some definite, single cause underlies the sharp geographical distribution of the disease, but has not been able to discover what this is. It is interesting to note, however, that a similar relative immunity to carcinoma on the part of southern regions exists outside of France, as is shown by the following list of deaths per 100,000 from carcinoma recorded in 1906 to 1907; England, 91; Scotland, 95; Ireland, 78; Norway, 100; Denmark (towns), 136; Holland, 101; Prussia, 71; France, 76; Switzerland, 129; Austria, 78; Hungary, 42; Spain, 48; Italy, 61; Algeria (European population), 32. From this it can be seen that the Mediterranean countries have less than half as many carcinoma deaths as the others, with the exception of Hungary.

Bertillon also believes that the assertion that carcinoma is on the steady increase cannot be denied, since, in most countries with reliable statistics, it has doubled in frequency in the last thirty years. The

¹ *Presse Méd.*, 1911, No. 38, p. 385.

increase is limited to persons over fifty-five years of age, carcinoma in the young being just as rare as ever. A careful study of the Paris cancer records, according to anatomical locality, indicates that the increase has to do entirely with carcinoma of the stomach and rectum; cancer of the mouth and of the breast shows no increase, and cancerous affections of the female genital organs are even diminishing in frequency. The latter observation has been made, also, by Van Konijnenburg, in Amsterdam, where carcinoma of the digestive system has doubled in frequency, while in the breast and the female genital system, it has remained almost stationary.

The fact is, therefore, very strikingly brought out, that whatever is increasing carcinoma seems to affect chiefly the digestive tract, with the exception of the mouth. Perhaps meat, the eating of which is certainly on the increase, has something to do with it, although the author made a careful study of the conditions in forty-nine villages, in which the consumption of meat, per head, was known, without being able to show any definite relation between it and the occurrence of carcinoma.

RIBBERT'S BOOK ON CANCER. Among the more important contributions of the last year to the subject of carcinoma in general, Ribbert's latest book, *Das Karzinom des Menschen; sein Bau, sein Wachstum, seine Entstehung*, Bonn, 1911, must be conceded a prominent position. In this work of 500 pages, the author has discussed, from many standpoints, the entire subject of human cancer in a most thorough manner; he has, as he states in the preface, "attempted to deepen and improve his views, and in so far to approach those of his opponents that he can meet them on a common ground, but in the fundamentals of his teaching he stands firm, since nothing convincing has been brought forward against them."

According to Ribbert, the origin of a carcinoma may be discovered only in its very first developmental stages—not on the edge of well-developed tumors; skin carcinomata are most suitable. A marked cellular infiltration of the connective tissue is always associated with the epithelial invasion, or rather, *precedes* the latter. So outspoken is this cellular infiltration, even in the very earliest stages, that it cannot be considered a result of the epithelial proliferation, and as this inflammatory infiltration cannot have arisen without cause, some inflammatory agent must have been present. In all beginning skin carcinomata, the surface is covered with a scab, consisting of horny cells and sebaceous gland secretion, which acts as a constant irritant to the underlying skin, not only to the epithelium, but also to the cutis; *the absorbed metabolic products cause inflammatory changes in the connective tissue.*

Ribbert, while admitting that a reduction in the differentiation of the epithelium may occur before the changes in the connective tissue, maintains, absolutely, that without inflammatory changes in the connec-

tive tissue, epithelial proliferation can never occur. The entire sum and substance of the book are expressed in the one sentence—"carcinoma originates as a result of subepithelial inflammation, which is caused by epithelial products, and which diminishes the differentiation of the epithelium, and liberates its proliferative growth." The more the epithelium extends into the connective tissue, the more does it lose its physiological connection with the original epithelium, and the more does it shunt itself off, becoming transformed into independent, parasitic, cancer epithelium.

Carcinoma arises in a given, circumscribed area. While still in the earliest developmental stage, the portion first formed—usually in the middle—may be joined by younger portions (multiple in-budding of epithelium into the connective tissue), but when the carcinoma is once formed in the entire area of origin, it grows farther only by proliferation of its own elements; there is no transformation of adjacent or surrounding cells into carcinoma cells. "*Das Karzinom wächst nur aus sich heraus.*"

Stomach and intestinal carcinomata arise, Ribbert believes, on the same principle, and generally on the basis of a polyp. The epithelial proliferation here is preceded by cellular infiltration, as in skin cancer, this infiltration being due to irritation by material absorbed from the intestine, which would normally be carried off by the lymph vessels of the mucosa—an action which is lacking in the polyp—and from products of metabolism of the tissue of the polyp itself, which, on account of its complicated structure, are not discharged into the intestine as they should be. Of the mode of origin of glandular carcinomata, practically nothing is known, since no one has ever seen the beginning stage of one of these.

With regard to the etiology, Ribbert believes that a parasitic causation may be absolutely excluded. Many carcinomata arise on the basis of developmental defects, and many as a result of chronic inflammatory processes; the former method applies, however, to only a limited number; the latter, to practically all. It is exceedingly doubtful if a real, spontaneous healing—*i. e.*, complete disappearance of the tumor—ever occurs, but there can be no doubt that individual cells are destroyed, as only on this theory can the fact be explained that certain organs, as the heart, spleen, brain, are comparatively seldom the seats of metastases. Probably the cells brought to these organs are destroyed by them, or, at least, do not find suitable conditions for development. It is also certain that, after the removal of the original growth, small metastases quite often disappear. The fact that *x*-rays and radium destroy cancer cells and not normal tissue elements, shows that the former have less vitality than the latter. Ribbert believes that some progress may be made in the way of producing immunity to cancer.

Diagnosis of Cancer. Realizing that in the present state of our knowledge and therapeutic resources, a positive and early diagnosis is the most important single factor in the successful treatment of any given case of malignant disease, workers in every field of medicine have, in the past few years, been giving a great deal of attention to this phase of the problem, and an immense amount of work has been done upon it. An enormous number of different tests, physical, chemical, or serological in character, have been brought forward; almost every normal or abnormal body fluid, secretion, and excretion has been the subject of searching examination, to see if some specific reaction could not be discovered which would positively indicate the presence of a malignant process hidden somewhere in the body.

While the vast majority of these tests have failed utterly to justify themselves, and the optimism of their sponsors has been rudely shattered by subsequent investigations, and notwithstanding the fact that not a single one has been demonstrated to be in any sense absolutely pathognomonic of malignancy, a certain number of reactions have been discovered which are apparently based on more or less rational grounds, and which at least give sufficient promise of being of real, practical value as to warrant their extensive trial and investigation. Several of these are urinary tests, various investigators having attempted to discover some definite product of cancer metabolism, or other substance, in the urine, which should be of diagnostic value.

TEST OF SALOMON AND SAXL. Some years ago, Salomon and Saxl noticed an apparent increase in the oxyproteic acid and similar substances in the urine of persons afflicted with cancer, and now report the results of investigations, by themselves and others, in 500 cases of malignant and nonmalignant conditions.¹ The reaction is somewhat complicated, and requires, as the authors admit, considerable experience and great nicety of technique for its successful accomplishment. It consists briefly in oxidizing the neutral sulphur element of the oxyproteic acid with peroxide of hydrogen. For this purpose, any albumin present in the urine is first removed by boiling and filtration; the clear urine is then treated with hydrochloric acid and a barium chloride solution. After standing on an actively boiling water-bath for six hours, it is allowed to cool; inside of twenty-four hours a precipitate of barium sulphate forms, which is very carefully filtered out, and the filtrate then treated with a strong peroxide solution. After boiling gently for fifteen minutes, the fluid is poured into a conical glass. If a considerable brownish precipitate, consisting of barium sulphate mixed with urinary coloring matter, occurs after twelve to twenty-four hours, the reaction is considered positive; otherwise, negative. The authors have found the reaction positive in 70 per cent. of all carcinoma cases

¹ *Wien. klin. Woch.*, 1911, xxiv, 449.

examined, whereas almost all the nonmalignant cases gave a negative result. In a few cases of liver cirrhosis, liver abscess, splenic tumor, and in one or two other conditions unassociated with malignancy, however, and in the urine of practically all pregnant women, the reaction was positive.

Following the publication of these results, the reaction was investigated by a number of other men, of whom Arzt¹ came to the conclusion that it is of real diagnostic worth, whereas Kaldeck² and Pibram³ got such irregular results that they consider it of doubtful value, or, at most, only to be considered in conjunction with clinical findings and other diagnostic methods.

The original authors have, therefore, tried somewhat to simplify the technique, and, in a subsequent paper,⁴ have given a slight modification of their method, which remains, however, in all essentials, unchanged. They report, at the same time, further investigations on 223 additional cases; 41 of these were carcinoma patients, and in these they found the reaction positive in 34, doubtful in 1, and negative in 6. In the 182 nonmalignant cases, it was positive in 9, doubtful in 1, and negative in 172. The authors believe, therefore, that further investigations will show this reaction to have a distinct value in the diagnosis of carcinoma.

TEST OF SALOMON, SAXL, AND FALK. A somewhat different reaction, which nevertheless stands in rather close relationship to the one just described, also has been proposed as a means of cancer diagnosis by the same authors in conjunction with Falk.⁵ It consists in determining the amount of polypeptids excreted in the urine, and is performed in the following manner: The quantity of amino-acids, in a given amount of urine, is determined by formol titration. In a second specimen of the urine, the polypeptids are then transformed into amino-acids by boiling with concentrated hydrochloric acid and condensation; the hydrochloric acid is driven off on a water-bath, and the formol titration carried out as before. This gives the amount of amino-acids plus polypeptids present; from this is subtracted the result of the first titration, giving the amount of polypeptids alone. The authors found a decided increase of polypeptids in the urine of carcinoma patients, the increase paralleling the increased oxyproteic acid elimination.

COLLOID-NITROGEN TEST. Salkowski⁶ is the originator of a urinary reaction which he calls the "colloid-nitrogen test." It is dependent upon a comparison of the total nitrogen content of the urine with the quantity of nitrogen precipitable by absolute alcohol—the so-called

¹ Sitzungsbericht der k. k. Gesellsch. der Aerzte in Wien, 1911, March 17.

² Wien. med. Woch., 1911, No. 24. ³ Wien. klin. Woch., 1911, xxiv, 1235.

⁴ Deut. med. Woch., 1912, xxxviii, 53.

⁵ Falk, Salomon, Saxl, Med. Klin., 1910, vi, 510.

⁶ Münch. med. Woch., 1910, xlvii, 1746.

“colloid-nitrogen.” For this purpose, Salkowski evaporated a given quantity of urine to syrupy consistency, treated it with an equal volume of absolute alcohol, and allowed it to sediment. After twelve to twenty-four hours, the whitish precipitate which formed was filtered off, and repeatedly washed with absolute alcohol until this came away entirely free from nitrogen; the precipitate was then dissolved in water, the amount of nitrogen contained therein determined by the Kjeldahl method, and compared with the total nitrogen in the urine as determined by the same method.

Salkowski found that the colloid-nitrogen in normal urine amounted on the average to 3.5 per cent. of the total nitrogen, whereas in urine from carcinoma patients, it amounted to 7.5 to 8 per cent. and that, while these figures varied considerably in individual cases, the highest percentages reached by nonmalignant cases rarely equalled or exceeded the lowest obtained from malignant ones. Owing to the technical difficulty of securing a satisfactory precipitate by the use of absolute alcohol, Salkowski and Kojo¹ have subsequently published a modification of the original method which depends upon the discovery that the colloidal nitrogen may be equally well precipitated by salts of the heavy metals.

Any salts of phosphoric or sulphuric acid present in the urine must be first removed by precipitation with barium chloride and filtering; the filtrate is then neutralized with acetic acid, and precipitated with subacetate of lead, zinc chloride, or zinc sulphate. The precipitate is then washed, and its nitrogen content determined as before.

Caforio² tried the colloidal nitrogen test according to Salkowski's original method (alcohol precipitation) on the urine of 28 cancer patients, and of 22 patients with other acute or chronic diseases, and found that the percentage does increase in a distinct and fairly constant manner, even in the early stages of tumor formation. He does not believe, however, that this increase is specific for carcinoma, as it occurs in other pathological conditions as well, especially in tuberculosis and liver disease, but it is never found in healthy individuals, and it disappears from the urine of cancer patients after removal of the tumor.

Although this test cannot, therefore, according to Caforio, be considered a pathognomonic criterion for carcinoma, it has a distinct negative value, for when no increase in colloidal nitrogen is found, the possibility of a carcinomatous condition can pretty surely be excluded.

The colloid-nitrogen test, according to Salkowski's modified method, has been further investigated by Einhorn, Kahn, and Rosenbloom,³ who obtained their precipitate by the use of zinc sulphate. They found in normal individuals that the colloid-nitrogen varied from 1.2 per cent.

¹ Münch. med. Woch., 1910, xlvii, 2297.

² Berl. klin. Woch., October 9, 1911.

³ Arch. f. Verdauungskr., 1911, xvii, 557.

to 2.2 per cent. of the total, averaging about 1.9 per cent., whereas in 24 cases of malignant disease (comprising 21 carcinomata, 2 sarcomata, 1 hypernephroma), it varied from 2.3 per cent. to 8.5 per cent. with an average of 4.5 per cent. In 26 cases of nonmalignant disease, they found the ratio low in most instances; in a few it was increased, but only in conditions which can easily be differentiated clinically from carcinoma. These authors consider the high percentage of colloid-nitrogen, which was present in all the carcinoma cases, of great significance, and believe that this test is of real value in diagnosis.

METHYLENE-BLUE TEST. Another urinary test for carcinoma, which has simplicity, if nothing else, to recommend it, has been proposed by Fuhs and Lintz.¹ These authors noticed that methylene blue is, in many cases, decolorized by the urine of carcinoma patients, and, on further investigation, found that in certain other conditions, as rheumatism, nephritis, and meningitis, a decoloration also sometimes takes place, but to a minor and varying degree; moreover, these conditions can generally be easily differentiated clinically, and in them the test, even if at first positive, becomes negative at subsequent examinations as the condition improves, so that it appears to have some value in the diagnosis of malignant disease.

So far, the authors claim to have obtained a positive reaction in every well-developed case of malignancy, the diagnosis being, in most instances, corroborated subsequently by operation or autopsy. An interesting point about this test is that, like Salomon and Saxl's neutral sulphur reaction, it is almost constantly positive in pregnancy. The technique is simply to mix with a test-tube of fresh urine a few drops of Löffler's methylene-blue solution, shake, and allow to stand at room temperature for twelve to twenty-four hours; as a control, a fresh specimen of known normal urine being similarly treated. At the end of this time, the blue color should disappear, except in the upper portion, which is in contact with the air, where it remains to a certain extent. If the blue color does not disappear in the deeper portions of the urine, the reaction is negative.

Verbrycke,² however, does not agree with Fuhs and Lintz, that this simple test is of any value whatever in the diagnosis of cancer. He has tried it in 50 nonmalignant cases, 4 cases of known gastric carcinoma, and 1 of probable cancer, obtaining a negative result in 3 of the patients in whom a carcinoma of the stomach was found at operation, and getting a positive result in 15 out of the 50 non-malignant cases. He says that he had intended to try the reaction on a series of 200 cases before publishing his results, but thinks that these 55 cases have sufficiently proved its fallacies to render a further investigation useless.

¹ Journal of the American Medical Association, 1911, lvi, 1882.

² Medical Record, 1911, lxxx, 876.

MEIOSTAGMINE REACTION. Among the large number of serological methods that have been brought forward for the diagnosis of cancer, the "meiostagmine reaction" of Ascoli,¹ is one of the few that appears to be of value. It is based upon the theory that a true immunity reaction occurs in cancer as in bacterial infections; the test itself depends upon the fact that, when antigen and antibodies are brought together, a reduction in the surface tension of the mixture takes place, supposedly due to substances of low adhesive pressure, which are formed by the reaction of antigen and antibodies.

The technique of the reaction consists, very briefly, in extracting the essential principles of diseased tissue (*e. g.*, carcinoma) as the antigen; this is added to the serum of the patient to be tested, and the surface tension of the mixture ascertained by counting the number of drops to a given quantity of fluid, by means of the "stalagmometer," a special form of pipette constructed for this purpose. The mixture is then incubated at 37° C. for a definite time, and the surface tension again estimated. If it has decreased, as shown by an increase in the number of drops to the same quantity of fluid, a physicochemical reaction has occurred, and the result is considered positive. Ascoli claims that if an antigen is tested with a serum containing specific antibodies, a reduction in the surface tension will almost always take place, whereas if no antibodies are present no change will occur.

This reaction has been subjected to more or less thorough investigation by a number of men, among whom Monakow² reports a positive result in 209 out of 234 known cancer cases, or 89 per cent., and a negative result in all but 3 of 233 cases without tumor, or almost 99 per cent. Leidi³ has tried it in a much smaller series of cases, and believes that it is of great clinical value, although it does not give absolute results. He obtained sixteen positive reactions out of twenty neoplastic sera, and twenty-two negative ones from twenty-four non-neoplastic sera. He emphasizes the fact that, on account of the great technical difficulties, this reaction requires much care, skill, and practice on the part of the investigator if the results are to be of any value.

Bernstein and Thomas⁴ have tried it in a still smaller number of cases (4 cases of typhoid, and 12 of malignant disease), and have not been able to obtain any results of diagnostic value. Stammli,⁵ however, who has given it a much more thorough tryout, thinks that the discredit into which the meiostagmine reaction has fallen, in the hands of certain investigators, is due to the difficulty in securing a satisfactory

¹ Münch. med. Woch., 1910, No. 2; Ascoli and Izar, Münch. med. Woch., 1910, Nos. 8, 18, 22, and 41.

² Münch. med. Woch., 1911, lviii, 2207.

³ Berl. klin. Woch., 1911, xlviii, 1716.

⁴ American Journal of the Medical Sciences, 1911, cxlii, 852.

⁵ Münch. med. Woch., 1911, lviii, 1957.

antigen, as well as to the exceedingly careful and exact technique required in its performance.

Stammler has examined 340 sera from patients suffering with various diseases, 120 of these being from definite malignant tumor cases. From the latter, he obtained a positive result in 73 per cent., and a similar result in 20 per cent. of the non-malignant cases, comprising benign tumors, syphilis, tuberculosis, etc. In these, the positive reaction occurred chiefly in acute fevers, and in nearly all cases of enlarged prostate, but not at all in severe cachexias of non-malignant origin. He considers the reaction a valuable aid in connection with the clinical picture, but by no means an ideal diagnostic agent.

CELL REACTION OF FREUND AND KAMINER. Another of the cancer tests of a serological nature, which seems to hold out some promise of being of value, is the cell reaction of Freund and Kaminer.¹ These authors have found that the serum of normal individuals will destroy cancer cells, whereas the serum of patients, the subject of cancerous disease, will not. For the purpose of this reaction, pieces of carcinoma tissue are cut up into very small bits in a weak sodium bi-phosphate solution, pressed through cloth, washed, and suspended in physiological salt solution. This suspension keeps in good condition for several months. To 1 c.c. of the serum to be tested, 1 drop of the cell suspension is added; they are thoroughly mixed, and the cells counted in a Zeiss blood-counting apparatus. After incubation for twenty-four hours, the cells are counted again, a marked diminution constituting a positive reaction.

Freund and Kaminer examined a series of seventeen sera from carcinoma patients, and another series of seventeen sera from patients suffering from other conditions, the sera being taken in some cases from living individuals, in others, from cadavers, and tested out against various samples of tumor material. They obtained a positive reaction (*i. e.*, a destruction of cells) in all but two of the non-carcinomatous sera, or 88 per cent., and a negative result in all but 2 of the carcinoma cases (88 per cent.); in these 2, the destruction being but a partial one.

This cell reaction has been employed by Monakow (*loc. cit.*), in the examination of sera from 15 malignant, and 52 non-malignant cases. Of the 15 cases of malignant tumor, in only 1 instance did he obtain a reduction in the cells amounting to over 25 per cent.; in other words, the reaction was negative in 86 per cent. of the cases. His results with the 52 non-malignant sera were not so satisfactory, however, as a quarter of them failed to cause destruction of the cells, thereby acting like carcinoma sera, and only two-thirds showed definite destruction, the remainder being doubtful.

Krauss, Graff, and Ranzi² have also tested this reaction in a compar-

¹ Biochem. Zeit., 1910, xxvi, 312.

² Wien. klin. Woch., 1911, xxiv, 1003.

atively small series of cases, and have found a positive cell destruction in only 61 per cent. of the non-malignant cases, while it was present in 25 per cent. of the malignant ones. They class only those reactions as positive in which there is a diminution of 50 per cent. or more, of the cells between the first and second count. They believe that this reaction depends on a change that occurs in the blood serum as a result of the metabolic products of malignant neoplasms; they consider it of some value in supplementing the clinical diagnosis, but in nowise conclusive, and agree with Monakow, that the meiotagmine reaction is in some ways probably more reliable.

FETAL SERUM TESTS. Two of the last-mentioned authors¹ have made some exceedingly interesting investigations with fetal serum and with that from pregnant women. They call attention to the fact that Salomon and Saxl² have showed an increased elimination in the urine of oxyproteic acid in carcinoma cases and in pregnancy, and that Falk and Hesky³ found in the urine, during pregnancy, an increase of amino-acids and polypeptids, as was demonstrated in carcinoma cases by Falk, Salomon, and Saxl.⁴ It occurred, therefore, to Kraus and Graff to ascertain if any parallelism existed between the action of the *serum* of cancer patients and that of pregnancy.

For this purpose they employed the Freund-Kaminer cell reaction, and found that serum from umbilical cord blood does not dissolve cancer cells; in other words, it acts like serum from carcinoma patients. The serum of pregnant women, however, does dissolve the cells up to the tenth lunar month, at which time it loses some of its cytolytic power, and, in many instances, shows the same reaction as that from the umbilical cord. The authors believe this quality of the fetal blood to be derived from the placenta, which, therefore, or rather the developing ovum, may be considered to produce in the maternal organism changes similar to those caused by a newgrowth, namely, the disappearance of the carcinolytic properties of the normal blood, or the production of inhibiting substances. These findings are, therefore, quite in accord with those of the above-mentioned urinary reactions.

ANTIFERMENT REACTION. The so-called "antiferment" or "anti-trypsin" reaction of Brieger, has found a warm advocate in Pinkuss, as a measure of diagnostic and prognostic value in cancer. It consists in mixing one platinum loopful of blood serum with one, two, three, etc., loopfuls of a 1 per cent. trypsin solution, and spreading the mixture on a Löffler blood-serum plate. Normal blood serum should prevent three times its amount of the trypsin solution from liquefying the surface of the Löffler plate. Pinkuss⁵ reports that, in 98 cases of carcinoma in which the diagnosis was subsequently made by the clinical course,

¹ Krauss and Graff, *Wien. klin. Woch.*, 1911, xxiv, 191.

² *Loc. cit.*

³ *Zeit. f. klin. Med.*, lxxi.

⁴ *Loc. cit.*

⁵ *Berl. klin. Woch.*, 1910, xlvii, 2342.

or by operation, he found the antitrypsin-index of the serum raised in all but 6; he has found that it may be increased, also, when considerable purulent foci are present in the body, and occasionally in cases of pneumonia, exophthalmic goitre, pernicious anemia, icterus, uremia, and nephritis, but these conditions may be excluded clinically, and such cases are not suitable for this test. He believes, therefore, that the antitrypsin reaction is of great value as an aid to carcinoma diagnosis, and that it also has a prognostic value, since, if it remains high after operation, it indicates that the case is not cured.

In a subsequent paper,¹ the author says that further experience has fully confirmed all his previous views. They have also, he says, been corroborated by Katzenbogen,² who tested the antitrypsin reaction at the Strassburg Gynecological Clinic, finding the index increased in 14 out of 15 carcinoma cases, and also in a few non-malignant ones where purulent or marked inflammatory processes were present. That the reaction is not due merely to a cachectic condition is shown by one case in which it was positive in a well-nourished girl, aged eighteen years, in whom, at operation, an ovarian carcinoma was found. It was also found that an originally high index, in several cases of uterine carcinoma, sank markedly after the performance of a radical Wertheim operation, whereas no decrease was seen after palliative operations in inoperable cases.

Pinkuss reports 5 cases in which, clinically, a suspicion of a recurrence following operation was present, but in which the index remained persistently low. In all these, the subsequent course showed that no recurrence had taken place. In 10 other cases, the occurrence of a high or increasing index indicated the presence of a recurrence, a suspicion which was subsequently justified. He calls attention to the much greater simplicity and ease of performance of this test, as compared with the meiostagmine reaction or the Freund-Kaminer cell reaction, and to its greater constancy of results, and believes that if, after every radical operation for cancer, the patient was kept under observation, and, at regular intervals, a test made of the antitrypsin-index, an early diagnosis of recurrence, and thereby, in many cases, the performance of a timely re-operation would be made possible.

Non-operative Treatment of Cancer. An activity, parallel to that exhibited in the effort to find reliable ways of diagnosing malignant disease in its incipency, is being shown in the attempt to discover some mode of treatment which, if not replacing the knife, will enlarge and augment the efficacy of surgical measures, and also be of value in inoperable cases. While the situation, as regards actual accomplishment, in this field is very similar to that in the realm of diagnosis, results are obtained from time to time in one or another line of endeavor,

¹ Deutsch. med. Woch., 1912, xxxviii, 55.

² Berl. klin. Woch., 1911, No. 41.

that certainly must offer hope for the future, and encourage to further effort.

ASCITIC FLUID. Risley,¹ working at the Massachusetts General Hospital, under the direction of the Harvard Cancer Commission, has been treating cases of inoperable cancer with various normal and abnormal body fluids, along the lines originally suggested by Hodenpyl.² Risley treated one group of cancer patients with ascitic fluid obtained from individuals suffering from cancer in all stages, a second group was treated with various normal and abnormal body fluids other than cancerous, and a third group was not treated at all, but watched coincidentally as controls.

The method employed for obtaining the cancerous ascitic fluid was to tap the peritoneal cavity under aseptic conditions and draw the fluid into a sterile bottle, which was kept on ice until used. A negative Wassermann was required from each individual furnishing ascitic fluid, and a culture was made from the fluid, some of it being injected into mice, to be sure of its sterility before being used on human subjects.

No effect whatever was seen from any of the non-cancerous fluids. Sixty-five cases were treated with fluid from cancer patients. In all these the condition was inoperable, and, in all but 3, the diagnosis was confirmed by microscopic examination. The amount of fluid given varied from 5 minims to 50 c.c., averaging about 15 c.c. Some swelling and hyperemia in the tumor itself practically always occurred following the injection, regardless of whether this was given directly into it, near by, or at a distance. The reaction usually lasted a few hours, and seemed to the author to speak for the specificity of these fluids. In some cases, slight constitutional symptoms were noticed, with fever up to 102°, but rarely exceeding this. In no instance did urinalysis give any evidence of a nephritic condition.

In 5 cases, a diminution or complete abolition of pain occurred; in 3, a breaking down and sloughing of cancerous tissue, with subsequent cleaning up and the formation of more healthy granulations. Cessation of the bleeding was seen in several cases of uterine carcinoma. In a number of cases apparent retardation of the growth for several months occurred, but in two instances the treatment seems to have been followed by an increased rate of growth, and in no case did actual shrinkage take place. Many of the patients showed, for a time, a marked gain in weight and strength. The author concludes that by this treatment great symptomatic relief can be obtained in a good percentage of cases, but that it has no permanent effect in preventing or in checking the growth of cancer, or in permanently benefiting the patient.

EMULSION OF TUMOR CELLS. The same author has tried, in 20 cases, the use of a vaccine consisting of an emulsion of the living tumor

¹ *Journal of the American Medical Association*, 1911, lvi, 1383.

² *Medical Record*, 1910, No. 26.

cells of the patient himself, obtained by grinding the tumor to a pulp, with the addition of sterile salt solution, and then injecting this emulsion into the abdominal wall, as was originally proposed by Gilman and Coca.¹ Risley² reports that in none of his recently operated cases was recurrence prevented, nor was the growth retarded in the inoperable ones. In a great proportion of cases, on the other hand, an increased activity on the part of the cancer cells was apparently produced, in addition to which abscess formation was very frequent, leading to great danger of sepsis. He believes, therefore, that this method of treatment is not only useless, but dangerous.

ANTIMERISTEM. Schmidt³ is the originator of a vaccine treatment of an entirely different character. He believes that cancer is due to infection by a parasite belonging to the class of "mycetozoa," which goes through the vegetative period of its developmental cycle in the human or animal body, while the reproductive period occurs in a fungus, *mucor racemosus*, which acts as the intermediate host.

His theory is that air-borne spores of this fungus fall on the moist surfaces or secretions of malignant tumors, and are penetrated by the spores of the mycetozoa, which go through their reproductive cycle in the developing fungus. They eventually become scattered with the spores of the latter, and are carried by air or water into other animal or human bodies. Here they can cause malignant tumor formation, however, only if they come in contact with anaplastic, or, rather, atavistic tissue. Since the parasite loses its virulence in the saprophytic form (this corresponding to the "Micrococcus neoformans" of Doyen), an available culture for the production of malignant tumors experimentally, or of a vaccine, can be obtained only by growing the reproductive form with its intermediate host; the killed product of such a culture forms the "cancroidin," or "antimeristem," used by Schmidt in his work.

His treatment is based on the principle of active immunization, having for its purpose the establishment of immunity without any local reaction, his vaccine acting in this respect in a manner entirely different from toxins, such as are employed by Coley, whose purpose is to produce liquefaction of the tumor by injections directly into it, or in its immediate neighborhood. Since the action of "antimeristem" is to produce in the body a protective force against the occurrence of carcinoma, Schmidt believes that its chief field of usefulness will be in the prevention of recurrences after operation, and says that, since he has been applying this treatment, he has seen no recurrences, and that similar results have been communicated to him by others. He realizes that it will

¹ Philippine Jour. Med. Sciences, December, 1909.

² Boston Medical and Surgical Journal, 1911, clxv, 784.

³ Wien. med. Woch., 1908, Nos. 27 and 28, and Zeit. f. ärztl. Fortbldg., 1911, viii, 649.

be only after an operator, having at his disposal a large material, has given it a thorough trial, that definite judgment can be passed.

Antimeristem is of value, according to the author, not only as a prophylactic, however; it is possible, by methodic procedure, to obtain by its use an immunity in those already subjects of cancer, and thus to arrest or cure the disease. In treating such patients, no attempt is made to destroy the tumor, but only to immunize the body against its causative agent. As soon as the proliferative stimulus disappears, the tumor itself becomes an inactive foreign body, is encapsulated, and undergoes degenerative changes.

The cure is not ended with the disappearance of the tumor, however; months later, recurrence may take place, owing to a gradual wearing off of the immunity, so that for a year or more, small doses should be injected at intervals of several weeks. In applying the treatment, marked cachexia should be considered an absolute contraindication, for here too much of the metabolic products of the tumor is being absorbed into the economy, and it is not desirable further to increase this absorption. It is best to begin with very small amounts, the individual dose and the interval between, being governed by observation of the results. In the earlier stages, especial attention should be paid to the subjective symptoms—improvement in general condition, increase of appetite, cessation of local pain; in the later stages, to the objective symptoms—increase in the body weight, and reduction in the size of the tumor. The injections should be interrupted for a few days on the appearance of any local reaction, as indicated by a gradual increase of the morning temperature, or the appearance of inflammation in old injection sites.

In a later paper, Schmidt¹ reports cures in 3 cases of inoperable carcinoma of the cervix uteri. In all these, large cauliflower masses were present, with bleeding and foul discharge. In 2, an apparently complete cure, accompanied by a total disappearance of the growth, was accomplished by a course of treatment, lasting about six weeks. Both patients have remained free from recurrence for a period of about a year and a half. In the third stage a hopelessly inoperable condition was reduced to one of operability, accompanied with a marked improvement in the general condition of the patient. The radical operation was performed, since which time (two years ago) the patient has remained well, with no sign of a recurrence.

A few men besides Schmidt have tried antimeristem in inoperable cancer cases, with rather varying results. Aronsohn,² for instance, reports the cure of a case of advanced larynx carcinoma, in which the whole right side was involved, in a man, aged seventy-four years; but a second case, in a patient aged forty-six years, was apparently uninfluenced. Beresnogowsky³ also tried it in 2 cases, one a colloid cancer of

¹ Zent. f. Gyn., 1911, xxxv, 1711.

² Zeit. f. Krebsforschung, 1910, ix, 367.

³ Ibid., p. 372.

the breast, the other, a squamous-celled carcinoma of the larynx. Both came to autopsy, and no effect of the treatment could be detected.

De Beule¹ saw marked improvement in a case of uterine cancer with deep cervical crater and extensive involvement of the parametrium; the parametrial involvement had entirely disappeared, the crater was healed, but for one small spot, and the general condition of the patient was excellent, when death suddenly occurred from acute peritonitis, due, Schmidt thinks, to a rupture into the peritoneal cavity of pus that had been allowed to accumulate by reason of insufficient attention to the cervical crater during the healing process. He has himself had a similar case.

MICROCOCCUS NEOFORMANS VACCINE. During the past year, Potter² has treated 11 cases of inoperable carcinoma, and 1 of sarcoma, with micrococcus neoformans vaccine (Parke, Davis & Co.), the rationale of this method being based on the work originally done by Doyen, of Paris, and carried on by Jacobs and Geetz, two of Sir A. E. Wright's assistants. In 3 of Potter's cases there was no change, but in all the others, among which were two breast and two uterine carcinomata, improvement was soon noticed after instituting the treatment. The method was to start with 25,000,000 to 100,000,000 organisms, gradually increasing the dose to 200,000,000, the injections being given once or twice weekly. The most constant result obtained was the relief of pain, which occurred to some extent in every case, notwithstanding the fact that no morphine was given, but in some instances, was suddenly stopped as soon as the vaccine treatment was begun. In the uterine cases there was a marked and a lasting decrease in the hemorrhage and the discharge; in most instances, the general health was improved, cachexia disappeared, and there was a gain in weight and strength, but no actual diminution in the size of the growths could be observed. As far as the relief of some of the most distressing symptoms in these patients is concerned, the author is well pleased with the results of the treatment.

RADIUM TREATMENT. Finzi³ explains clearly the principles and methods employed in the treatment of cancer with radium, and reports his results. He says that, in order to use it with satisfaction, only the rays of great penetrating power, the so-called γ -rays should be employed, as the α and β -rays, of much less penetrating power, merely cause local irritation and interfere seriously with the treatment. In order to filter them out, the radium should be enclosed in a casing of lead or platinum at least 1.5 mm. thick. Large quantities of radium are to be preferred to small, although, theoretically, a given quantity acting for a given period of time, should give the same dose as twice the quantity acting for half the time. Practically, however, this does not appear

¹ Belgique médicale, 1910, Nos. 48 and 49.

² Medical Record, November 25, 1911.

³ Lancet, May 20, 1911.

to be the case, and the author says that since using the comparatively large quantity of 205 mg. (having a value of something over £3000), his results have been much more satisfactory than when he had only 50 mg., and he does not consider, even now, that he has nearly enough.

He believes that the best way to treat deep growths is to imbed the radium-containing apparatus directly in the malignant mass, even making an incision for this purpose, if necessary. It has been found that the ratio of destructive activity exerted by radium on cancer cells, as compared with normal body cells, varies greatly in different types of tumors; it may reach as high as 20 to 1, but the average is about 5 to 1; and, in some tumors, there is no differential action whatever, *e. g.*, in epithelioma of the tongue and of the vulva, so that these should never be subjected to this form of treatment. Naturally, those tumors with the highest selectivity-ratio are the most favorably influenced.

Finzi reports 99 cases, almost all of which were inoperable. He was able to cause complete local disappearance of the growth in 12 cases, very great relief in 20 (in 10 of these, which are still under treatment, it appears as if complete disappearance would take place), substantial relief in 42, and no improvement in 25. Two of the cases of complete local disappearance subsequently died of intercurrent disease, and, in one, an autopsy revealed the presence of deep recurrences in the liver and other organs. He considers carcinoma of the uterine body one of the very best types to treat, although his personal experience is limited to 2 cases; one of these had a heart lesion, and got a cerebral embolus, from which she subsequently died, but the other showed marked and rapid improvement. Cases of cervical carcinoma are on the whole not so favorable, as the selectivity-ratio is usually rather low, but they may be relieved, and, in some instances, an inoperable condition transformed into an operable one.

Moullin¹ also approves of the use of the largest possible amounts of radium in the treatment of malignant tumors. He says that a preliminary hyperemia is caused by its action, which favors the rapid growth of tumor cells, unless at the same time a sufficient quantity of the hard, penetrating rays are driven into them to prevent it. He has seen the outlying portions of a tumor spread at a greatly increased rate, while the centre was being successfully treated with radium, and feels sure that there is considerable risk in treating any but small, superficial growths with the amount of radium at the command of most observers at present. He considers 10 cg. of the pure salt the minimum that should be at the disposal of anyone who wishes to treat malignant tumors successfully, and does not believe in introducing radium tubes into the interior of tumors, since any manipulation, however slight, tends to cause a dissemination of the growth.

¹ *Lancet*, May 20, 1911.

Arendt¹ has treated a number of cases of uterine carcinoma, not with pure radium salts, but with a very slightly purified form of the raw Joachimsthal uranium-pitchblende, from which radium is obtained. In inoperable cases, he thoroughly cures and cauterizes away as much as possible of the carcinomatous tissue, and then introduces a strip of gauze soaked in 30 per cent. zinc chloride solution. Two or three days later, the pitchblende treatment is begun, for this purpose the material being packed into a sterile thin rubber finger stall of the proper size, which is wrapped in a few thicknesses of iodoform gauze, and introduced into the crater. Each time that the treatment is applied, the cavity is first cleaned out with peroxide of hydrogen.

In operable cases, a radical extirpation of the uterus is first done, and then, as early as the third day, the radium treatment started, Arendt believing that this offers a certain amount of protection against recurrence. He has used it so far in 18 inoperable, and in 8 postoperative cases. Of the former, 8 patients are still living and under treatment, 6 of them being in good condition, 3, in fact, giving the impression of being entirely healthy individuals. Four of the postoperative cases came under observation when in already hopeless condition with advanced metastases; they died soon after. In the other 4 cases, treatment was begun immediately after operation; 3 are free from recurrence (length of time that has elapsed since the operations not stated), while recurrence took place in the fourth.

The author does not believe that the radium treatment of uterine carcinoma offers prospects of a real cure, but that it certainly does cause a vast improvement in the condition of the patients, and lengthens the life of many of them, several of the patients who came to him in a hopeless condition being free from pain and discharge after two years, a state which may be considered as bordering on a cure. He emphasizes the fact that great caution must be observed during the treatment, especial attention being given to absolute cleanliness. The pitchblende mass is at first changed every day, later, every three to four days; it is apparently allowed to remain constantly in place.

WASSERMANN'S EOSIN-SELENIUM COMBINATION. A method of attacking malignant disease, which, although still in the purely experimental stage, is of the greatest interest, as it opens up an entirely new line of endeavor in this direction, has recently been reported by Wassermann,² of Berlin. In principle it is based on Ehrlich's salvarsan work; Wassermann has attempted to find some chemical substance, which, introduced into the circulation, shall show a specific affinity for malignant tissue, destroying it, and it only, in the same way that salvarsan is supposed to attack and destroy the spirochetæ. It was revealed

¹ Deutsch. med. Woch., 1911, xxxvii, 1478, and Berl. klin. Woch., 1911, No. 8.

² A. v. Wasserman, Keysser, and M. Wassermann, Deutsch. med. Woch., 1911, xxxvii, 2389.

more or less accidentally during some experiments with mouse tumors, that the salts of tellurium and selenium have an affinity for tumor cells, and that by injecting these directly into malignant growths, a softening and liquefaction and, in some cases, complete disappearance could be produced.

Intravenous injections of sodium telluride and sodium selenide, however, produced no results; evidently, the selenium and tellurium did not get into the tumor. The problem now became one, to use Ehrlich's expression, of "laying tracks" to conduct these substances to the desired point; obviously, this was only to be accomplished by forming some chemical compound which should be very readily diffusible throughout the tissues. For this purpose, the investigators tried various combinations with substances of the fluorescin group, which are known to possess this property, many hundreds of such combinations being experimented with before one was found which worked with any constant degree of success. This is a soluble combination of eosin and selenium, which requires certain very delicate chemical treatment before it becomes fully active. So far, experiments have been carried out only on mouse tumors, cases being selected which showed no tendency to spontaneous regression. After two or three injections of the eosin-selenium combination into a vein, the tumor begins to soften, soon presenting the feeling of a fluctuating cyst; as the process goes on, the liquid contents are absorbed, the sac becomes empty; finally after about ten days all traces of the tumor have disappeared in successful cases.

In many cases, however, especially where the tumor is very large, the animals show marked constitutional symptoms, and die, evidently as the result of the toxicity of their absorbed tumor masses. If the animal lives and the tumor has been entirely destroyed, no recurrence takes place; but if a few cells have been left, owing to an insufficient number of injections having been given, the growth quickly recurs. Autopsies on mice in the stage of softening and liquefaction, show the entire tumor mass deep red in color in contrast to the much paler surrounding tissue; evidently, the substance has shown a *selective action*. Not only have various strains of inoculated mouse carcinomata and sarcomata been experimented on and cured, but two mice which developed spontaneous tumors have been treated with the same result.

Wassermann states that, so far, they have merely demonstrated the falsity of the old theory that no substance could be found, which, introduced into the blood, would selectively attack and destroy tumor cells without injuring the organism; that now, knowing that such substances do exist, and having discovered a means of "building a road for them to travel," it must be the work of the future to see if these general principles can be applied to human therapeutics.

Operative Treatment of Cancer. EARLY OPERATION. Winter¹ says that it was impressed on him twenty years ago, when he was first

¹ Zeit. f. Krebsf., 1911, x, 343.

assistant in the Gynecological Clinic at Berlin, that in very many instances of inoperable carcinoma of the uterus, the women themselves were responsible for the hopelessness of their condition; in others, the blame rested upon the physician whom they had first consulted. When he became the head of an institute in the province of East Prussia, which gave him the necessary authority and standing, he began to take up the question seriously. The problem was attacked chiefly along three lines:

(1) All the practising physicians in the Province were instructed, by means of a pamphlet, as to the methods and the importance of making an early diagnosis.

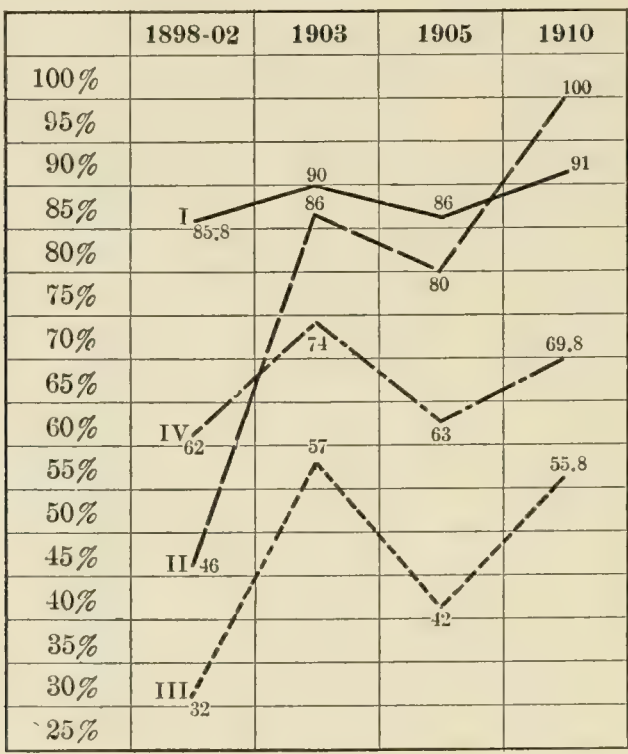


FIG. 48

(2) All midwives were instructed to send any carcinoma-suspicious patient *immediately* to a physician.

(3) By means of articles in the more important newspapers, the general public were enlightened as to the early symptoms of uterine carcinoma, and were urged to seek immediate medical advice.

The results attained by this campaign are shown graphically in the accompanying table (Fig. 48). The first period, 1898 to 1902, shows the condition of affairs before any special action had been taken; the second, 1903, comprises the year that immediately followed the institution of the campaign; the third, 1905, gives the results of an investigation made two years later, to determine what lasting effects it had had; and the fourth, 1910, shows the present status of the situation. The data were obtained from the records of the clinic and from reports of specialists.

Curve I shows the effect upon the physicians, the criterion here being whether or not an internal examination had been made by the physician to whom the patient had applied for advice (it will be seen that even now this is true in only 91 per cent. of the cases); Curve II shows the action of the midwives, the percentage here being based on the criterion, whether or not a suspicious case applying to a midwife had been immediately referred to a physician. Curve III is an especially important one, as it shows the attitude of the patients themselves; it was obtained by reckoning the per cent. of patients who had sought advice within three months of noticing the first symptoms. Curve IV gives the percentage of operability, and therefore represents, to a certain extent, the resultant of all the others.

It will be seen that all the curves show a marked rise, consequent to the opening of the campaign, that all had fallen back somewhat two years later, only to show another marked improvement of late. It is noteworthy that apparently the least improvement is shown by the curve representing the attitude of the physicians, but Winter remarks that he has sent out no direct appeal to them since the original brochure of 1903. He concludes that every such publicity campaign has an evident and substantial effect, but that this is only temporary.

The success of his system of combating uterine carcinoma has had, however, one notable result, which was entirely unexpected by Winter, namely, that in Germany, nine medical organizations, and eleven special societies have followed in his footsteps, while in Austria-Hungary, France, England, Switzerland, Holland, Belgium, Russia, Denmark, Norway, Sweden, Italy, and the United States publicity campaigns, more or less according to his model, have been set on foot. He mentions the fact that no radically new methods have been introduced, and that his ideas were unanimously approved by the Second International Cancer Congress, in Paris. He thinks that it is now time to extend his program over the whole of Prussia, hoping that the other German states will follow the lead, and also to extend this form of activity to other than uterine cancer, especially that of the breast and rectum, because the symptoms of both of these are likewise frequently disregarded, both by the laity and the profession, on account of the inconvenient or indelicate examinations necessary for their diagnosis, and he urges the general surgeons to institute a similar campaign against gastric carcinoma.

He realizes that this extension of the work will demand much time, labor, and money, but believes it to be practicable, and that the human lives saved will infinitely more than repay the effort of the undertaking. He concludes by detailing his plans for instructing the various classes of physicians, medical helpers (such as nurses, midwives, etc.), and the general public, as to the true nature of cancer, the possibility of its surgical cure when taken *early*, and its hopelessness when the opposite is true. He does not believe that any undue dread of the disease will

be engendered in this way, his experiences in East Prussia during the past eight years having showed this fear to be unfounded.

COMPARISON OF THE RESULTS OF OPERATION BY EUROPEAN AND AMERICAN OPERATORS. Jacobson,¹ in a very extensive résumé of the subject, presents a summary of the results obtained in the surgical treatment of carcinoma of the uterus by the leading European and American operators. He considers that the radical abdominal operation may be said to be still in its infancy, and calls attention to the fact that while there is, at the present time, no other disease in gynecology around which so much interest centres, there is none regarding whose surgical treatment so little unanimity of opinion exists as is the case with cancer of the uterus. He presents the results in 2765 cases of the radical abdominal operation obtained from a study of the literature, and from personal communication, 298 of these being from American, the remainder from European surgeons.

Most of the author's information, with regard to the work in America, was obtained from personal communication, and from the comparatively few replies from men who had had personal experience with the operation obtained in answer to over three hundred letters sent out, as well as from the scarcity of cases reported in the American literature, Jacobson says it is evident that the radical abdominal operation for carcinoma uteri is not receiving the attention and recognition in this country that it has abroad.

The operability is reported by various surgeons as ranging from as low as 5 per cent. to as high as 92 per cent., that of the Europeans being, on the whole, decidedly above that of the Americans, as is shown by the following table:

PERCENTAGE OF OPERABILITY.			
<i>European Operators.</i>		<i>American Operators.</i>	
	Per cent.		Per cent.
Berkeley and Bonney	67	Peterson	20
Bumm	90	Rider	40
Döderlein	68.6	Jonas	50
Franz	81.3	Cannady	50
Jeannel	30	Smith	20
Krönig	87	Janvrin	10
Klein	40	Tate	15
Küstner	68.7	Cumston	5
Lockyer	70.6	Frank	25
Mackenrodt	92	Poucher	100
Müller	89.5		
Polosson	56	Average operability	35
Reinicke	40.7		
Rosthorn	36		
Wertheim	60		
Average operability	65.17		

¹ Journal of the American Medical Association, 1911, lvi, 96.

In all the 2765 operations recorded, there were 538 deaths, giving a primary mortality for the entire series of 19.45 per cent., agreeing very closely with what has usually been considered the average primary mortality of the radical abdominal operation, namely, 20 per cent. While the European surgeons record a higher operability, they also have, as might be expected, a somewhat higher primary mortality than the Americans, this being 19.94 per cent. for the former as against 15.77 per cent. for the latter, though these figures differ greatly among different operators, as for example:

Döderlein	in 209 operations	had 30 deaths or 14.3 per cent.
Jacobs	in 95 operations	had 6 deaths or 6.4 per cent.
Kline	in 52 operations	had 7 deaths or 12.8 per cent.
Zweifel	in 192 operations	had 17 deaths or 10.8 per cent.

That the primary mortality, moreover, is constantly being reduced in the hands of the more experienced operators as the technique is becoming better developed, is shown by the following table of more recent statistics of four of the most prominent German gynecologists:

Döderlein	in 40 operations	had 2 deaths or 5.0 per cent.
Krönig	in 47 operations	had 2 deaths or 4.2 per cent.
Wertheim	in 53 operations	had 3 deaths or 5.6 per cent.
Veit	in 20 operations	had 0 deaths or 0.0 per cent.

It is evident that the relatively high mortality of the radical operation is due largely to the greater number of cases considered operable, the result being that cases are attacked which would be considered inoperable by any other method. The consensus of opinion seems to be that death is due, in most instances, to infection and sepsis, and not, as a rule, to shock, as has been generally supposed. The infection is probably the result of the presence of pyogenic bacteria in the carcinomatous masses, and the large area of raw surface exposed during the operation.

With regard to the final results attained by this operation, it is difficult to obtain a great amount of information, owing to its relative newness. The following surgeons, however, report permanent cures five years after operation, the percentages referring to the cases *actually operated on*, and not to the total number of patients applying for treatment:

	Per cent.
Rosthorn	20.0
Veit	30.0
Wertheim ¹	58.6
Polosson	60.0
Reinicke	35.0

¹ Wertheim's statistics were presented in detail in these pages last year.

The average of these five surgeons is 40.72 per cent. of the *operated* cases which remained cured five years after operation; the "absolute cure" in all cases in the hands of these men—*i. e.*, the percentage of *all* carcinoma cases applying for treatment alive and well after two to six and one-half years—is about 21 per cent. As against these figures, the Americans can show but 8.39 per cent. of cures five years after operation, with an "absolute cure" of only about 1 per cent.

While the advisability of removing enlarged and carcinomatous glands, found at the time of operation, is still under discussion, and, although most operators agree that when such glands are found, recurrence is the rule, the fact that almost 30 cases have been reported by various authors, in which carcinomatous glands were removed at the operation, but who were well and free from recurrence three years or more later, should cause us to give the question of attempting the removal of enlarged glands our serious consideration before deciding it in the negative.

DÖDERLEIN-MEYER STATISTICS. Meyer¹ presents a careful study of the cases operated on in Döderlein's clinic during the years 1902 to 1905 inclusive, at least five years, therefore, having passed since the performance of these operations. The method employed was the radical extirpation according to Wertheim. The total material comprised 248 cases; of these, 211 were cervical carcinoma, with an operability of 59.7 per cent.; 37 were corpus carcinoma, of which all but 2 were operable. The average primary mortality in the cervical cases was 20 per cent.; in the corpus cases, 10.7 per cent. The mortality in the cervix cases has been steadily reduced, however, from 36.6 per cent. in 1902, to 10.8 per cent. in 1905; during this time, the operability has steadily increased, reaching in the latter year to as high as 72 per cent., so that the reduction in mortality cannot be ascribed to a more careful choice of cases, but is due rather to improvements in technique and asepsis.

Meyer was able to demonstrate, definitely, a recurrence in 38.9 per cent. of all operated cases of cervix carcinoma; in addition to these, a number died with symptoms that strongly pointed to the probability of a recurrence having taken place, but no autopsies having been performed on these cases, this could not be positively proved. Adding this second group to the first, he finds that in 50.8 per cent. of all the operated cervix cases, recurrence certainly or probably took place. Here again, the figures for the series of corpus cases are more favorable, only 26.9 per cent. of these showing definite, 40 per cent. definite or probable recurrence. Meyer has found the glands involved in about one-third of all operable cases; of these, the disease recurred in something over 80 per cent., whereas 50 per cent. of the cases in which no

¹ Monatssch. f. Geb. u. Gyn., 1911, xxxiii, 701.

carcinomatous glands were found at operation remained free throughout the five-year period of observation.

He reports 3 cases with carcinomatous gland involvement, in which no recurrence took place, and takes a somewhat mid-position with regard to the advisability of removing the glands, calling attention to the fact, that, although as a general thing, only those cases are cured in which there is no gland involvement, yet even this small group of 3 cases shows that occasionally a lasting cure is obtained by removal of the glands, which is therefore not to be regarded as a wholly worthless procedure. He admits, however, that recurrence may take place in these cases even after a longer period than five years, and thus the cure turn out to be only apparent. He does not agree with Pfannenstiel, however, that the operation should not be carried out if enlarged glands are found at the beginning, since a large proportion of these are not actually carcinomatous. He believes that the practical solution of the problem is to remove, as far as possible, glands which are distinctly palpable.

In three-fourths of the cases with recurrence, the parametrium was *clinically* involved, showing that the prognosis is rather bad when the parametrial tissue can be clinically diagnosticated as affected; it must be noted, however, that this involvement could be also clinically demonstrated in about two-thirds of the cases which remained free after operation, a condition which can only be explained by the thoroughness with which the parametrium was removed, and which therefore emphasizes the importance of excising this in the most radical manner possible. In the series of cases upon which Meyer's paper is based, over one-half showed extensive parametrial involvement, and only about one-fourth were *entirely* free from this.

The lasting results obtained, in the series of cervix cases under discussion, were as follows: 29 per cent. of the cases in which the radical operation was performed, and 17.1 per cent. of *all* cases which presented themselves for treatment, were well and living after five years, the latter figure representing the "absolute cure." Since only one case had been lost sight of, these figures may be assumed to represent fairly accurately the results attained. Of the series of corpus cases, 52 per cent. of the operated ones, and 46.4 per cent. of all cases have withstood the five-year test, here again, the figures being markedly better than in the cervix cases. Meyer emphasizes the fact, that in all these statistics he has been very strict, and has reckoned all doubtful cases among the recurrences, counting as cured only those in which he has, by personal examination, assured himself that such was actually the fact. In conclusion, he states briefly the results obtained in previous years by Döderlein and himself, by vaginal operation, these being much poorer than by the radical abdominal method of Wertheim. He emphasizes again and again the fact, that not by raising the limit of

operability, but only by procuring an increased proportion of *early* cases among those coming to operation, can we expect greatly to better the results.

HOFMEIER'S RESULTS. Hofmeier¹ gives his results in the treatment of carcinoma of the cervix during the years 1899 to 1910 inclusive. During this time, 393 cases applied for treatment, of which 205 were considered operable, giving an operability of 52 per cent. Seven patients refused operation, 105 were operated upon by the abdominal and 91 by the vaginal method; in 2 cases, merely a high cervix amputation was done (both of these remained well over five years). The author says that in cases of small localized carcinoma of the portio vaginalis, in women over sixty years of age, and in very fat patients, he has generally done the vaginal operation; in young women, and particularly in those who have recently borne children—the danger of recurrence in these being especially great—he has usually chosen the abdominal route, though each case was judged on its individual merits.

Deducting the cases operated on by his assistants, Hofmeier has performed, personally, 75 radical vaginal operations with 6 deaths, giving a mortality of 7.8 per cent. Of the cases operated on up to 1906, 37.5 per cent. were alive in 1911, *i. e.*, five years later. During the same period, the author has done 90 abdominal operations, with a mortality of 20 per cent., which, however, has come down from 27.6 per cent. at first, to 11.6 per cent. at present. Of the cases operated on by this method, five years or more ago, 31.3 per cent. remain cured. The “absolute cures” for the entire series of cases which presented themselves during the period under consideration, amounted to 14 per cent. (Hofmeier, in reckoning his percentages, has left all cases lost track of, and those dead of intercurrent diseases, out of account altogether, instead of counting them among the recurrences as do most other authors, so that his figures appear slightly more favorable than they would by the stricter method of calculation.)

In his abdominal operations, the author has followed Wertheim's technique very closely. He has used spinal anesthesia almost exclusively, and believes that the danger to the patient is considerably reduced thereby. In the 90 operations, enlarged glands were removed in 46 cases, but only 18 of these proved to be carcinomatous. In no case in which the glands were actually involved was a lasting cure obtained, though in some of these recurrence took place only after two to three years. He believes, nevertheless, that the removal of enlarged glands is justifiable, as occasionally a case may be saved in this way. He considers the assertion that a carcinomatous gland may, at times, overcome the malignant cells after the main focus has been removed absolutely unproved.

¹ Zeit. f. Geb. u. Gyn., 1911, lxi, 453.

Notwithstanding the apparently slightly lower mortality and higher percentage of cures in his vaginal than in his abdominal series of operations, Hofmeier says that, on account of the better view of the operative field and the smaller amount of hemorrhage, he prefers the abdominal method, and is coming to use it more and more. He thinks the better results from the vaginal operation in his series are largely due to the fact that this was for the most part carried out in the simpler and more favorable cases.

TWEEDY'S EXPERIENCE. Tweedy¹ says, that since taking up the Wertheim operation for carcinoma of the uterus, he no longer considers fixation of the uterus, pain, purulent discharge, infiltration of the broad ligaments, or cachexia contraindications to operation; he refuses to operate only on patients with serious involvement of the rectum, or of the bladder with pyuria. He considers extreme fatness a hindrance, but not an absolute contraindication to the abdominal operation, and believes in operating on almost every case, if only in the hope of affording a certain amount of temporary relief. He carries out a preliminary treatment, consisting of curettage, the actual cautery, and the insertion of a vaginal plug soaked in formalin, on three or four consecutive days before operation, this being repeated as the patient is being anesthetized for the operation.

In advanced cases with extensive involvement, so that it is impossible to free the vagina from the bladder and rectum, he amputates the uterus as low as possible through the cancerous cervix, and then finds it easy to remove the remaining carcinoma tissue. He considers the danger of general peritonitis, from opening up the cancer tissue, very great, and, to prevent this, places the patient in the exaggerated Trendelenburg position, keeping the intestines out of the pelvis by means of two or three rolls of six-inch gauze bandage soaked in hot saline solution, and made to envelop the viscera. He has tried sewing the peritoneum to the skin as a preliminary, but has given it up, as it prolongs the operation and is of doubtful efficiency.

He reports a series of 33 cases operated on for carcinoma of the cervix, with a mortality of 24.25 per cent. and 11 cases of carcinoma of the body, with a mortality of 9 per cent. None of these cases were done long enough ago to give a five-year observation period. Of the 33 cervix cases, 9 were known to be living six months to four years after operation, but in 4 of these, recurrence had taken place. Of the 11 corpus cases, 5 were alive three months to three years after operation. Among the 33 cervix cases, there was but one nullipara, while only 4 out of the 11 corpus cases had borne children.

SCHAUTA'S STATISTICS. Notwithstanding the fact that, following the brilliant work of Wertheim, most of the German operators are giving their attention to perfecting the abdominal operation for uterine

¹ Jour. Obstet. and Gyn., Brit. Emp., 1911, xix, 401.

carcinoma, there are still a few men who are raising their voices in favor of the vaginal route. Among these, the most important is Schauta,¹ who reports the results of ten years' experience with the radical vaginal operation in the treatment of carcinoma of the cervix. During this time, no less than 910 patients suffering from this condition presented themselves at Schauta's clinic (no cases of corpus carcinoma are included). Of these, 44 refused operation, and 445 were actually operated upon, giving an operability of 51.3 per cent. Forty cases died, giving a mortality of 8.9 per cent., which, however, in the last three years, has been reduced to 3.7 per cent. During the first half of the ten-year period which furnishes the basis for Schauta's report, 477 patients presented themselves at the clinic, and 211 were operated upon. For all of these patients, therefore, the five-year observation period since operation is available, and of them, 73 are known to have been alive and well for this period or longer, after operation, giving an "absolute cure" in 16.6 per cent. of all cases applying for treatment, and a lasting result in 39.7 per cent. of the cases actually operated upon. In reckoning the "absolute cure," Schauta says that he has followed Wertheim's principle of counting all cases lost track of (in this series, 4 cases), and all dead of intercurrent disease without autopsy, in with the recurrences.

He emphasizes the fact, that the radical vaginal operation does not mean merely making the Schuchardt paravaginal incision; that this signifies no more here than does the incision through the abdominal wall in the abdominal operation. The whole point of the operation consists in the careful dissection and exposure of the ureters, the ligation of the uterine arteries, the wide excision of parametrial tissue out to the pelvic walls, and the formation of a vaginal cuff to prevent leakage of carcinoma tissue from the cervix. He draws a comparison between his own statistics and those of Wertheim, showing that while Wertheim has an operability of but 48.9 per cent., and a mortality of 18.6 per cent. with the abdominal operation, he himself has had an operability of 51.3 per cent., and a mortality of but 8.9 per cent. with the radical vaginal operation. Although Wertheim has attained a lasting cure in about 1.8 per cent. more cases than Schauta, the latter believes that of two operations giving so nearly equal end results, the one accompanied by the lesser primary mortality is in many cases to be preferred as giving the patient the best chance for increased length of life, although he thinks that both operations should have their place in modern gynecological surgery.

THORN'S EXPERIENCE. Another advocate of the vaginal route is Thorn,² who reports the results of operations performed in his private

¹ *Monat. f. Geb. u. Gyn.*, 1911, xxxiii, 680.

² *Gyn. Rundschau*, 1911, v, 601.

clinic during the years 1896 to 1905 inclusive, a five-year observation period being, therefore, available for all these patients. There were 265 cases, of these 77 were carcinoma of the portio vaginalis, 150 of the cervix proper, and 38 of the corpus. Fourteen patients refused operation, and are, therefore, deducted; of the remaining 251, operation was performed on 128, giving an operability of 51 per cent. Of these, 2 cervix and 2 corpus cases were operated on by the abdominal route, the remaining 124 by the radical vaginal method. As a direct or indirect result of the operation, 7 patients died, giving a primary mortality for the entire series of 5.5 per cent.; 65 were alive after five years, an absolute cure of 25.9 per cent. (it should be remembered that these figures include corpus and cervix cases together). For the cervix cases alone, Thorn's figures are: Operability 44.2 per cent., mortality 5.2 per cent., absolute cure 19.35 per cent. For the corpus cases alone, the absolute cure was 70 per cent.

The author emphasizes the fact that the radical vaginal operation has nothing in common with the old simple vaginal hysterectomy; that the preparations secured by the former can often scarcely be distinguished from those by the abdominal method, although the latter is accompanied by much greater danger. He believes that both operations have their place, and that both have nearly reached their limit of accomplishment.

He says he has tried for twenty years, by talking and writing, to increase the number of early cases coming to operation, but has not seen any lasting effects of these efforts, and doubts if it will ever be possible to secure a noticeable and lasting improvement in this respect. He warns against attempting to increase the percentage of operability too greatly, believing that the increased primary mortality and the great number of injuries to the bladder, ureters, rectum, etc., in the cases which do not die, more than offset the occasional case that may be saved. With regard to glands, he follows Wertheim's dictum, and removes those which he can easily feel when operating through the abdomen, but he does not believe that the opportunity for doing this constitutes any great advantage of the abdominal over the vaginal method.

HIGH AMPUTATION. In view of the intense activity which is being shown at present, on the part of the German school of gynecologists, toward perfecting and extending the radical operations for carcinoma of the cervix, an article by Theilhaber,¹ expressing a somewhat more conservative point of view, is of more than passing interest. He calls attention to the excellent lasting results obtained by merely amputating the cervix, reported from Schröder's clinic in the years 1878 to 1886 by Hofmeier and Winter,² according to whom, out of 114 partial oper-

¹ *Zentralbl. f. Gyn.*, 1911, xxxv, 355.

² *Zeitschr. f. Geb. u. Gyn.*, Band xiii.

ations, 40 per cent. were alive and free from recurrence after four years, and 26.5 per cent. after eleven years.¹ Theilhaber says, that although this operation is now considered antiquated, there are many reasons for believing that the isolated extirpation of the cervix may, at times, be justified.

He considers the formation of carcinoma to be favored by bad nourishment of the mesodermic tissue; thus, malignancy occurs in old scars, especially in those situated in a region which, before operation, was a *locus minoris resistentiæ*. If now, in such a patient, only the cervix is removed, the fundus and ovaries being left in place, a blood wave of almost fourteen days' duration is poured into the internal generative organs every month. The consequence of this is a far better nourishment of the scar, and therefore a lessened tendency to recurrence. Extirpation of the entire uterus, leaving the ovaries, does not have the same effect, as after the removal of the uterus, the ovaries frequently atrophy. Another factor to be considered is, that the more extensive a scar, the greater opportunity does it give for a recurrence.

Acting on this theory, the author says that he has, in a number of cases of carcinoma involving merely the external surface of the portio vaginalis, done a high amputation of the cervix, finding it very easy to extirpate large portions of the parametrium and vagina at the same time. There is practically no risk to the patient, and microscopic examination of the cut surface of the amputated cervix shows whether any carcinoma has been left behind, in which case the rest of the uterus should be removed. Theilhaber believes that by the application of hyperemia after operation, in order to increase the blood supply of the tissues, recurrences can largely be prevented, and relates one case of breast, and one of uterine carcinoma, in which early recurrences disappeared after energetic hyperemic treatments.

FIBROID TUMOR OF THE UTERUS

Blood Supply of Uterine Myomata. A most interesting study of this question has been made by Sampson,² who has injected for the purpose 100 myomatous uteri removed at operation. In about one-half the cases a gelatine mass containing bismuth in suspension was used, the specimens being subsequently subjected to *x*-ray examination; the remainder were injected with gelatine containing Venetian red for the arterial system, and ultramarine blue for the venous. In some cases only one or the other system was injected, in others, both. After the injected gelatine had solidified, the specimens were placed in

¹ Verhandl. d. IX Kong. d. Deut. Ges. f. Gyn., p. 57.

² Transactions of the American Gynecological Society, 1911, xxxvi, 239.

formalin for from two to three weeks and then cut sagittally or transversely into slices varying from 3 to 15 mm. in thickness. Where bismuth had been added to the injection mass, stereoscopic radiographs were first made of the entire specimen, and then of serial slices of the same uterus, by which means it was usually possible to follow the entire course of each uterine vessel. The specimens injected with colored gelatine were used for gross study, and in a few instances microscopic sections were made as well.

By means of arterial injection, Sampson was able to demonstrate an arterial blood supply in almost all myomata, only a very few small tumors having been found in which this was not the case, a circumstance which may have been due to faulty injection, or to the small size of the vessels concerned. In uteri containing large tumors, the uterine vessels were frequently found to be increased in size, and apparently in number as well. There was found to be much variation in the vascularity of different myomata, large ones often possessing a much richer blood supply than the surrounding myometrium, whereas small tumors were, as a rule, decidedly less vascular. The arterial system inside the myomata usually presents one of two chief types of arrangement; either there is a diffuse proliferation of the intrinsic vessels and their branches, which extend in all directions throughout the tumor, or there is a marked development within the growth of arterial trees, whose branches or roots communicate with those of other trees, this latter arrangement being, in some cases, so extensive that the *x*-ray picture often suggests an arterial angioma rather than a myoma.

Specimens with injection of the venous system present a very different picture. While the normal endometrium is enormously rich in veins, these are almost entirely absent in myomatous growths—at least they appear to be so in injected specimens—the tumors therefore appearing anemic as compared with the surrounding tissue.

Myomata receive their nutrient blood supply from either a peripheral or a radial branch of one of the arcuate arteries of the uterus. The nutrient artery—or arteries, for there may be more than one—envelops the tumor by means of its branches, the latter penetrating the substance of the myoma. In large tumors there is frequently an additional blood supply obtained from a communication between the arterioles of the myometrium about the myoma and similar vessels in the periphery of the tumor, this condition being probably a secondary development, just as subserous myomata may become adherent to surrounding structures and derive a portion of their blood supply from them. Specimens from relatively old women show, as a rule, a less rich blood supply than those obtained from younger patients.

The author has not been able to answer satisfactorily the question as to how the blood gets out of the tumors, owing to failure to demonstrate a venous system in them, though he believes that this lack is

more apparent than real, being largely dependent upon technical difficulties. He thinks that a transference of blood from the arterial to the venous system must occur, to some extent at least, in the body of the tumor, but suggests the possibility that some of the blood may both enter and leave by means of arteries, going over into the veins outside the tumor.

In discussing his paper, Dr. Sampson brought out the additional very interesting fact, that in doing his injections he never saw any of the mass escape from the uterine cavity unless the patient had been actually bleeding at the time of operation, or unless the uterus had been removed during menstruation. In the latter case, the *venous* injection mass often escapes from the cervix, but it was not possible to cause artificial menstruation, even by the use of force, unless the uterus was in the menstrual stage, a further illustration of the fact that a good many other factors besides mere pressure are necessary for the production of menstrual bleeding.

Cervical Fibroid Tumors. Smead¹ declares that fibroid tumors of the cervix belong to a distinctive class, because of the technical difficulty attending the removal of such tumors. These tumors are not common, and this is especially so of the subperitoneal variety. Mann reports that he observed but 3 cases in the course of twenty-two years. A consensus of opinion of those who have written upon the subject places the proportion of cervical growths at 5 per cent.

Cervical fibroids may be subvesical, retroperitoneal, or intraligamentous. According to the vertical position of the tumor, Haultain divides them into supravaginal, intervaginal, and intravaginal. The term intervaginal applies chiefly to tumors arising under the movable vaginal wall covering the posterior part of the intravaginal cervix; that is, tumors developing into the posterior fornix.

Cervical fibroids may cause great distortion, and this may be so extreme that landmarks are largely obliterated, and when the abdomen is opened it takes a considerable time for orientation. The bladder may be enormously elevated and spread out over the anterior surface of the tumor, and the uterus may appear as a mere knob on the top of the tumor. Posterior tumors are apt to push up the peritoneum back of the cervix, and obliterate Douglas' pouch. Both the posterior and the lateral tumors have a tendency to raise the rectum and the sigmoid upward.

The vagina may be enormously elongated, or nearly crushed out of existence. The cervix, in these cases, may be at the extreme top of the elongated vagina, the external os being a mere slit in the side of the tumor, and well out of the reach of the examining finger.

Many of the fibroid tumors which obstruct labor are cervical in

¹ American Journal of Obstetrics, 1911, lxiv, No. 5, 790.

origin. A small anterior tumor situated just behind the trigone may act exactly like the middle or posterior lobe of an enlarged prostate, and partly block the urethra. The most frequent displacement of the ureters is a crowding down. This occurs oftener than elevation. They may occasionally be pushed up by a tumor growing below at the side of the cervix, but they are more often pulled up along with the peritoneum covering them, or by adhesions between the ureter and the tumor.

The author recommends careful examination before undertaking the removal of cervical fibroids, and considers it of great importance to know exactly the position of the vagina and the cervix, as their location is often the key to the whole operative problem. He also recommends cystoscopic examination to determine the amount of the displacement.

Urinary Disturbances Resulting from Cervical Fibroids. According to Legueu,¹ there have been reported in the literature so far about 250 cases of cervical fibromyomata of the uterus, in about 20 of which urinary troubles were present, these having gone on to complete retention in a considerable number. Where the retention is not complete, there is usually marked distention of the bladder, great frequency of micturition occurring as a result, but never completely emptying that organ. A case of this type is related in detail by the author. The patient, aged forty-two years, suffered from marked frequency of micturition, accompanied by great difficulty; the latter condition was rapidly increasing, the woman at times being scarcely able to pass even a few drops, although experiencing a strong desire to urinate. After the removal of a cervical fibroid weighing 15 pounds, the urinary troubles disappeared entirely, and the quantity of urine excreted in twenty-four hours increased from 1 liter to $2\frac{3}{4}$ liters. Strange to say, this large mass, wedged tightly in the pelvis, had caused no constipation or other rectal symptoms.

It is evident, says the author, that in these cases there is steady progress from a condition of mere dysuria to one of complete retention, the latter at times coming on very quickly once the tumor has reached a certain size. The most constant effect produced on the bladder is its elevation toward the umbilical region; it is carried by the tumor out of its usual pelvic position up into the abdomen, and it is in this position that retention occurs, three factors at least entering into its production: (1) *Lengthening of the urethra.* The occurrence of this is shown by the fact that the external meatus disappears from the vulva and comes to lie on the anterior wall of the vagina, rendering catheterization or exploration of the interior of the bladder impossible. Although the meatus is thus somewhat drawn upward, it cannot be elevated

¹ Jour. d'urologie, 1912, i, 33.

as much as the bladder, hence, a traction on the urethra occurs, with reduction of its calibre. (2) *Direct compression of the urethra by the tumor.* This is more apt to occur with small than with large tumors, as the latter, on account of their flatter curvature, do not force themselves so far up into the sub-symphyseal angle as to compress the urethra. (3) *Spreading out of the bladder on the surface of the tumor.* The bladder becomes spread out over the anterior face of the tumor, to which it is attached by adhesions in such a way that the two form almost one body, whereby the bladder is prevented from contracting properly, so that, finally, micturition is possible only by an effort of the abdominal muscles, forcing the tumor against the abdominal wall and compressing the bladder between them, an action, however, which is entirely insufficient completely to empty the latter organ.

In his operation, the author was not able to demonstrate the ureters, but thinks that some alteration in them, with consequent kidney insufficiency, must have been present before operation. He believes that this was due to the elongation which the ureters must have undergone to pass around the large tumor, with consequent diminution in their calibre, rather than to any direct compression. From the operative point of view, he emphasizes the necessity, in these cases, of sticking close to the tumor in order to avoid the ureters, and of making the incision high in the abdominal wall to avoid the bladder.

The Degeneration of Fibroid Tumors and the Surgical Attitude toward Them. Deaver¹ has analyzed 345 consecutive operations for fibroid tumor, with reference particularly to the degeneration of the fibroid tumor itself, whether benign or malignant, and to complicating malignant affections of the cervix or the body of the uterus.

He found that hyaline degeneration was the most frequent of the benign regressive changes. It was noted to a marked degree in about 11 per cent.; all fibroids of any size showed this condition somewhere. It has no clinical significance unless it reaches the stage of liquefaction and cyst formation. Such an occurrence is coincident with a rapid increase in size and an augmentation of symptoms. The product of this melting process is a material which varies from a gelatinous consistency to a thin and watery fluid. Tumors filled with the gelatinous material are often said to have undergone myxomatous degeneration, while those in which the thinning process has gone on to the production of a watery fluid, are termed cystic. In some series, both conditions are recorded together as cyst formation. In Deaver's series, Pfeifer found nine instances of myxomatous change, and three pronouncedly cystic, twelve in all (3.6 per cent.).

Necrosis usually affects a limited part of the tumor only, and gives rise to no symptoms. In some cases, however, the tumor may perish

¹ American Journal of Obstetrics, lviii, 257.

en masse, when there is more or less clinical disturbance. An extensive necrosis is most apt to affect pedunculated myomas, and is due to strangulation of the blood supply or to infection. Nevertheless, occasionally, an intramural fibroid will undergo sudden necrosis without obvious reasons; such an event is most common during pregnancy. Necrosis of this sort is a serious condition, chiefly because of the danger of secondary infection. A necrotic fibroid which projects into the cavity of the uterus, or possibly from the cervical canal, always becomes infected, and it is important not to mistake the foul sloughing mass for an inoperable carcinoma.

Christopher Martin found necrosis occurring in about 4 per cent. of fibroids. Noble found it in 119 cases of his series (5 per cent.). In Deaver's series it occurred twelve times, or 3.6 per cent. It does not materially increase the danger of an operation, unless it be already accompanied by infection. In sudden necrosis of an entire tumor, one usually finds definite symptoms pointing toward operative interference, such as pain, vomiting, rapid increase in size of the tumor, tenderness, and often some fever. When necrosis takes place in successive small areas, it is followed by a deposition of calcium salts, which, in turn, gives rise to the so-called calcareous degeneration. This was found eight times (2.4 per cent.).

Altogether, in Deaver's series, there was a total of 30 cases in which there was noteworthy benign degeneration (9.6 per cent.). He does not interpret this fact to mean that 10 per cent. of all fibroids show such degenerative changes, but that among a series of cases which are considered under present standards to require operation, 10 per cent. are causing trouble, which is largely the result of the degenerative changes which have occurred in them.

The malignant degenerations are of much greater importance. The only malignant change which a fibroid itself can undergo is, of course, a transformation into a sarcoma. Martin, in his recent paper, concludes that this occurs in approximately 4 per cent. of all cases. He quotes statistics, as follows: Winter found sarcomatous change in 4 per cent. of 500 myomas; Martin found 6 in 205 cases; Cullingworth, 1 in 100; Scharlieb, 6 in 100; Haultain, 2 in 120; Hirst, 3 in 189; McDowell, 20 in 1000 cases. Martin himself encountered 9 cases in 389 abdominal sections for myoma. These collectively total about 2 per cent. of sarcoma presumably arising upon a myomatous base. He goes on to say that probably many other cases thought to be primary sarcomata, have originated in unrecognized myomata, and from this assumption justifies himself in raising the true proportion to 4 per cent.

Bland-Sutton, however, has taken a directly opposite view, and states that quite possibly, sarcomas, which have been considered as derived from preceding myomas, have been sarcomatous from the

beginning. Noble, in his large tabulation, found only 34 cases of sarcoma, or about 1.5 per cent. It is not stated that these cases were all instances of sarcomatous degeneration of myomas, and it is quite likely that some, at least, were mere associations. Kelly and Cullen found sarcomatous degenerations or association in 17 out of 1400 cases (1.2 per cent.).

In Deaver's series, he found 4 cases (1.2 per cent.) which were diagnosticated pathologically as sarcoma. In the first case, the tumor, which was a small round-celled sarcoma, gave no evidence of its being derived from a myoma. The second case was a myxosarcoma, which also showed no evident connection with an antecedent myomatous condition. It seemed rather probable that such was not the case. The third case involved the ovary, and it is difficult to see what possible connection the fibroid condition of the uterus could have had in the origin of such a different condition.

In the fourth case, the sarcoma was in no way connected with the uterus. Clinically, there was nothing to suggest such a malignant change, and the patient has remained without recurrence. In this case, the patient was operated on primarily for a huge ovarian cyst, and the uterus found, after section, to be the seat of numerous fibroid nodules. The condition had been present for years, and the tissues were very atypical in appearance. Under such conditions, only those who are skilled in microscopic work know how difficult it may be to set the exact boundary between a malignant and a non-malignant change.

The personal equation of the pathologist must be taken into account in such cases. It is only thus that one can explain the high percentage of sarcomatous changes found by some authors who counsel minute microscopical examination of various parts of all the tumors present. Deaver is aware that it is by no means impossible for such a transformation to take place, but he cannot believe that this tendency is so marked as is stated by some authors. If it were true, then sarcoma of the uterus ought to be one of the most frequent of diseases, whereas it is comparatively rare. Simply to make use of the figures already given, taking 20 per cent. as the absolute incidence of myoma of the uterus in women aged over twenty years, if 4 per cent. be the tendency of myoma toward sarcomatous change, we should find sarcoma in 4 per cent. of 20 per cent. of all women, or 0.08 per cent., which is a *reductio ad absurdum*. The author does not desire to cast discredit upon the findings of anyone, but he must point out that either the experience of those who find such marked proportions of sarcoma must be exceptional, or else, that there is a subtle source of error in the standards of diagnosis.

In regard to the increased tendency to uterine cancer in fibroid uteri, Deaver reports that his series of cases showed eleven instances of

carcinoma associated with myoma (3.1 per cent.). Of these, 6 (1.7 per cent.) involved the body, and 5 (1.4 per cent.) were situated in the cervix. These figures agree very closely with Kelly and Cullen, who found, in 1400 cases of myoma, 43 of associated carcinoma (3 per cent.), of which 25 (1.7 per cent.) were in the body, and 18 (1.3 per cent.) in the cervix. Martin found 6 cases of carcinoma in 380 (1.6 per cent.), while Noble, in his large collection, found 2.8 per cent. of carcinoma, and among his personal cases, 4 per cent.

This is an alarming incidence of a desperate condition with one which is relatively innocent, and if we are able to incriminate myoma in the causation of cancer, it will be a heavy stigma. The instances of cervical carcinoma can hardly be credited to the presence of myomata in the body of the uterus. Not only is it difficult to imagine any way in which a fibroid should exercise such a malign influence upon the cervical epithelium, but clinically, we gain no impression that such is the case.

Bearing in mind that the uterus is the most common site of carcinoma as established by the large statistics of Welch, who found that cancer of the uterus furnished 29.5 per cent. of 31,482 cases of primary cancer, we must be prepared to find it associated with such a frequent pathologic condition as myoma, which furnishes at least a tenth of all gynecologic work. This association should cause no more remark than the simultaneous presence of carcinoma of the breast, stomach, bladder, or rectum, all of which have been noted in a number of instances.

Concerning carcinoma of the fundus, the case is different. If the presence of myoma does not influence the development of malignancy in the uterine epithelium, we should expect that the ratio of cervical to corporeal cancer would remain unaltered. This ratio is estimated at from 4 to 1 (Cullen) to 10 to 1 (Martin). My own statistics are more nearly in accord with the lower ratio, but, in any case, there can be no doubt that cervical cancer predominates largely over that which is primary in the body of the uterus.

Now of the cancers which are found complicating a fibroid condition of the uterus, we may see, by a glance at the above figures, that the preponderance is reversed and fundal cancer is found to be more frequent than that of the cervix. It seems a fair assumption, and one which is also suggested by the known tendency of chronic nutritional and irritative influences to excite malignant changes, that a well-defined number of cases of cancer of the body are precipitated by the presence of myomata. This, to Deaver's mind, is the most serious of the degenerative processes set in motion by a fibroid tumor, since it always arises insidiously, as do all cancers of the fundus.

Sarcoma is no less insidious, though less common, as a derivative of myoma. Together, they constitute a menace to life of no mean degree, and, though the results of observation and analysis of this series of

tumors do not support the pessimistic views of some gynecologists, the danger of malignant changes due to myomata is a fact which cannot be disregarded. The early operation for fibroids does not rest upon this factor alone, and high statistics of degeneration are not needed to support it. "A good cause can sustain itself upon a temperate dispute."

Deaver does not believe, however, that a fibroid, discovered accidentally and giving rise to no symptoms, should be immediately exposed to operation. He admits that this is not a large class of cases, and, therefore, not a very important one. He further states, that any tumor which begins to give trouble or atypical symptoms, even an irregular discharge alone, should be removed. The tendency toward malignant degeneration gives him one of the elements of his belief. The remainder are furnished by the greater frequency of troublesome non-malignant degeneration, the likelihood of hemorrhage and chronic anemia with cardiac and vascular disturbances, the frequency of pain, and more or less dangerous pressure effects upon the urinary tract, the intestines and the surrounding organs, the proved failure of fibroids to cease from troubling with the menopause, and the certainty that, in a large percentage of cases, delay merely means operation later and under less favorable conditions.

Observations upon Myomectomy. The advisability of treating uterine myomata by means of hysterectomy can be open to but little question in women aged over forty years, and to practically none in those aged over forty-five years, owing to the frequent association of malignant conditions with myomata after this time. It is, however, as W. J. Mayo¹ says, another question in the case of patients in the twenties and thirties. To deprive these young women of so important an organ as the uterus is a serious matter, and the author believes that increasing experience will show it to be seldom necessary. In 157 consecutive, unselected abdominal myomectomies, he has had but one death, and believes that these favorable results are largely due to following Ochsner's advice, to tie sutures only tight enough to *coapt* tissue and stop hemorrhage, not to *bleach* the tissues.

He says that since applying this principle in his operating, myomectomies no longer occasion him any particular anxiety. He has found that the use of an ordinary continuous catgut suture, closing all the dead space, is entirely satisfactory with regard to hemorrhage unless pregnancy is present, in which case, a slight oozing of blood may follow each needle puncture; in such cases it is well to take a tip of the omentum and fasten it with fine catgut sutures as a compression pad against the suture line. Opening the uterine cavity in the non-pregnant state during a myomectomy is not a serious matter, and may save a hysterectomy by permitting the removal of a polypus

¹ Surgery, Gynecology, and Obstetrics, 1911, xii, 97.

which was causing bleeding, and which could not be removed by the curette. Mayo says that in a few instances he has removed one entire wall of the uterus, with the corresponding tube and ovary, the adnexa of the opposite side being healthy. The remainder of the uterine wall in these cases was then fashioned into something resembling a uterus with endometrium, and these patients have menstruated regularly and painlessly, though, so far as is known, none of them have become pregnant.

In one case a myoma of the cervix larger than a grape-fruit was excised, necessitating the removal of the entire cervical canal from a point just below the internal os to a point slightly above the vagina; the widely separated fundus and vaginal remnant of the cervical canal were then, with some difficulty, sutured together. The patient menstruates regularly and without pain. With regard to the danger of overlooking small myomata, which will later necessitate a second operation, Mayo says that this is an eventuality that cannot be entirely eliminated, and must be accepted as such by the patient. In his series of 157 cases, he has only had to re-operate twice, in each instance after the lapse of a considerable number of years. He has had several cases of myomectomy during pregnancy, with no deaths, and only one miscarriage. He believes that the necessity for emptying the uterus, when myomata complicate pregnancy very rarely arises, and that hysteromyomectomy with the non-viable child must be considered one of rarest necessities of surgery.

Action of the X-Ray on the Ovaries and on Uterine Myomata. In view of the prominence which is being given in certain quarters to the treatment of myomata by the use of the *x*-ray, studies in the histologic changes produced both in them and in the ovaries, as reported by Jaugeas,¹ are of interest. He says that deep-seated glands, such as the ovaries, can be influenced by radiation as well as the thyroid or hypophysis, a fact which is of great importance, in view of the close relationship between the ovaries and the development of uterine myomata. Experiments on small animals have shown that exposure to the *x*-rays is followed by marked changes in the ovaries, such as degeneration of the follicle-epithelium, as evidenced by the occurrence of pyknosis and other degenerative processes, death of many of the ova, sclerosis of the bloodvessels, etc., leading finally to the total disappearance of all follicles.

Observations of human ova after *x*-ray treatments have shown, in many instances, a similar destruction of the follicle-epithelium, with entire replacement of many follicles by hyaline tissue. Small capillary hemorrhages in the ovarian cortex, which might well account for some destruction of tissue, have also been noticed occasionally. The changes

¹ La Gynéc., January, 1911.

produced in myomata are not so definite or distinct as those in the ovary, but nuclear degeneration, cellular destruction, and fine hemorrhages have been observed in myomata after treatment with the *x*-ray, and in tumors with young cells and active karyokinesis a direct inhibitory action on the growth of the cells must certainly be assumed to take place, as in other tumors.

With regard to the clinical side of the question, Jaugeas takes the standpoint that *x*-ray and surgical treatment should not oppose each other, but that each has its proper indications and contraindications. He considers that in cases of small myomata scattered throughout the uterine wall, and in all cases of fibrous or sclerotic uteri, in which hemorrhage is the dominant symptom, radiotherapy is distinctly indicated. It may also be justifiable in the treatment of large myomata of recent growth, provided no symptoms of compression are present which demand immediate relief, for in these cases the *x*-ray treatment must extend over months. Old, slow-growing tumors, as a rule, he has found to be but little affected by the *x*-ray, and he believes that for them, surgical extirpation is the proper method of procedure. In giving the *x*-ray treatment, he applies the tube alternately over each ovarian region, and over a midpoint corresponding to the fundus of the uterus, taking great care not to devitalize the skin in this latter region in case surgical intervention may become necessary later.

A much more enthusiastic advocate of the radiotherapy of myomata, and, indeed, of all forms of uterine hemorrhage not due to malignant disease, is Gauss.¹ He states that he has been using the method extensively for the past four and one-half years, but limits his present report to the last 100 cases, covering a period of about two years, because his technique has been practically uniform during that time. As a result of his experience, he states most positively that there is no such thing as a case of benign uterine hemorrhage due to myomata, metropathic conditions, etc., which will not yield to proper *x*-ray treatment; he therefore does not hesitate to persist in this form of treatment, even in the face of severe hemorrhage and a hemoglobin as low as 15 per cent.

Of the 100 cases included in his report, 55 were cured, 37 are still under treatment at the time of writing, and the few remaining either stopped treatment for family or other reasons, or presented some special contraindication, such as insanity, severe pyelitis, etc. The average duration of treatment, including all interruptions from whatever cause, amounted to three and one-quarter months. In elderly women, and in those with very large tumors, complete amenorrhea was secured in every case; in younger women, however, with only small myomata, a shrinkage of the tumor, and a reduction in bleeding, but not complete cessation of menstruation, was aimed at and usually attained.

¹ Zentralbl. f. Gyn., 1911, xxxv, 394.

The author considers that the success of α -ray treatment depends a great deal upon the skill with which it is applied, and says that, with the present development of technique, very large doses can be given at frequent intervals without injurious results, a fact of considerable importance, as experience has shown that the nearer together the sittings can be given, the better are the results. In no case, however, can a definite effect be produced in less than two months, as the injury to the ovaries caused by the rays, upon which the treatment depends, does not manifest itself until the first or second menstrual period after it has been started.

PELVIC INFLAMMATORY DISEASES

Abscess of the Uterine Wall. Barrows¹ calls attention to accumulations of pus within the uterine wall, depending upon a puerperal or other form of infection. He finds that little attention has been paid to these intramural abscesses of the uterus. Von Franqué has reported 15 cases, Noble reported 8, Mercadé, in 1905, after an exhaustive study of the literature, found 41 authentic instances. Lea reported 1, in 1904, and Sampson 4, in 1910. A majority were puerperal in origin. The author adds 7 cases, six of them of puerperal origin; the seventh was the result of gonorrheal infection.

The author believes that many times an intramural abscess of the uterus is overlooked, the case being diagnosticated as pyosalpinx; a spontaneous determination marked by a discharge of pus from the uterine cavity, bearing out this assumption, for it would be very difficult to conceive of a pus tube emptying itself in such a way, whereas an intramural abscess might readily do so. He thinks, also, that sometimes pockets of pus in the uterine wall may be opened and drained inadvertently by curettement, or that, in an effort to escape, the pus may make its way between the layers of the broad ligament and present itself in the neighborhood of the inguinal ring, appearing like a phlegmon of the broad ligament, which may be opened and drained extra-peritoneally.

Three of the six cases of puerperal origin had been subjected to some kind of operative procedure, so that the latter was a predisposing factor. In regard to the treatment of the condition, it is not wise to operate upon such cases during the acute stage. Incision and drainage is the best plan of treatment, but this should not be attempted until the case has been under observation and treatment from one to three weeks.

In the author's experience, the abscesses, as a rule, were located near

¹ American Journal of Obstetrics, lxiii, 575.

the fundus, and usually in the anterior aspect of that part of the uterine body. In them, all drainage was established suprapubically after a median abdominal incision. The single exception was drained through the vagina, the abscess, in that instance, being low down in the anterior wall of the uterus.

In establishing the suprapubic drainage, the author excised the omentum in the immediate vicinity of the abscess if that appeared to be infected. He also resected, as far as possible, the adhesions which he found between the intestines and the surrounding structures. He says that after the abscess has been healed, such protective intestinal adhesions melted away. In his cases, he drained the abscess cavity with rubber tubing, and the surrounding peritoneal surfaces with cigarette drains.

Inflammatory Tumors of the Abdomen Simulating Malignant Disease. Bruce¹ states that inflammatory processes closely simulating malignancy may arise in the sigmoid, rectum, cecum, and colon, and reports a number of interesting examples of this condition. In two almost entirely similar cases, a mass, about $2\frac{1}{2}$ inches in length, was found completely surrounding the sigmoid, reducing its lumen to the diameter of a goose-quill. In both cases obstructive symptoms were present, and a resection of about 4 inches of sigmoid, with end-to-end anastomosis was done, which was followed by complete recovery. The tumors appeared grossly malignant, but, on microscopic examination, were found to be purely inflammatory in character, in one instance the process being apparently a peri-sigmoiditis, due to extension of inflammation from a pyosalpinx and an ovarian abscess which were present.

In two other cases, which also very closely resembled each other, the omentum was found rolled up into a large tumor mass, red, and inflamed looking, which was densely adherent to the colon in such a way as to compress it and cause obstruction. In one case the patient died, and at autopsy the condition was found to be due to a perforated ulcer of the transverse colon, with inflammation of the omentum and hematoma formation; in the other case nothing could be done at operation, but the condition greatly improved under rest and care, practically all the symptoms having disappeared, so that the inflammatory nature of the process seems certain.

The fifth case was that of a patient who presented symptoms of cholelithiasis. At operation a mass the size of a tangerine orange was found involving the anterior wall of the stomach, with a perforation in the centre large enough to admit a small lead pencil. The mass was very hard, and was situated mid-way between the curvatures, reaching to within 1 inch of the pylorus. It was apparently an inoper-

¹ Surgery, Gynecology, and Obstetrics, 1911, xii, 102.

able carcinoma, but a small piece removed for microscopic examination showed that it consisted largely of fibrous tissue, and was inflammatory in nature. The patient had evidently had a gastric ulcer which had perforated, notwithstanding the enormous thickening which surrounded it. She made a good recovery, and except for some hyperchlorhydria, is well several years after the operation.

In still another patient, who also presented symptoms and palpatory findings pointing to the gall-bladder, a mass the size of a small orange was found projecting from the right lobe of the liver immediately to the left of the gall-bladder. On the surface of the mass were five or six flattened nodules as large as split marbles; the gall-bladder itself was empty. The mass resembled a secondary carcinoma, but careful exploration of the abdomen failed to bring to light any primary focus, so merely a small portion was removed for examination. It was reported to be syphilitic; the patient was put on mercury and iodides, following which the lump and all the symptoms disappeared within a few months.

The author remarks that these cases show how difficult it may be to differentiate between malignant and simple disease within the abdomen, even after the abdomen is opened, and that therefore a laparotomy should always be performed where the diagnosis is doubtful, even though the prognosis may appear hopeless, as a palliative operation may relieve urgent symptoms or result in an unexpected cure.

Endometritis. Since the publication of the somewhat revolutionary work on this subject by Hitchman and Adler¹ a few years ago, the interpretation of histological findings in the endometrium by most investigators has been more or less profoundly altered, according to the degree with which they have accepted these authors' views. An attempt to present, in a concise and unified manner, the general consensus of opinion at present with regard to the subject, has been made in a recent article by Albrecht.² He considers, that, while subsequent investigations have confirmed the general principles of Hitchman and Adler's work, they have also shown that it is impossible to make such an exact classification of the cyclic endometrial changes as those authors would have us believe.

While it is undoubtedly true that the endometrium is subject to periodic changes, which are probably dependent upon an internal secretory activity of the ovaries, there are marked variations in the individual types of these changes. The latter consist in general of an increase in the volume of the glands and of their epithelium, with correspondingly increased secretion, these phenomena being merely the expression of a hyperfunctionation of the glands, which reaches its height in the premenstrual period.

¹ *Monats. f. Geb. u. Gyn.*, 1908, xxvii

² *Ibid.*, 1911, xxxiv, 397.

Since, however, the periodical functional activity of the ovaries, as well as the responsiveness of the endometrium, are variable quantities, the development of these menstrual glands takes place irregularly, and they do not all collapse and empty their secretion during menstruation, as Hitchman and Adler maintain, but some of them can persist throughout; in the individual case, therefore, the histologic appearance of the endometrium does not always give definite information as to the exact stage in the menstrual cycle in which it was removed. Albrecht agrees entirely, however, that since the chief changes in endometritis—which is nothing but inflammation of the uterine mucous membrane—occur in the stroma, and not in the glands, the term “interstitial endometritis” is tautological, and should be given up.

He divides endometritis for practical purposes into acute, chronic, and specific, and demands that all the complex of tissue changes which are considered characteristic for inflammation in any mucous membrane shall be present in the endometrium before the case is diagnosed as one of “endometritis”; all the hyperplastic conditions, without true inflammation, are to be classed as pure hypertrophies. They have nothing to do with inflammation, though the symptoms may, in many cases, be identical. With regard to the etiology of endometritis, the author believes that most cases are of bacterial origin, though in the chronic form frequently no organisms can be demonstrated. It may also arise, however, without any bacterial assistance, as a result of toxins, either of external origin—such as caustic applications, or of internal origin—such as degenerating polyps, myomata, retained secundines, etc., and also from the toxins of infectious disease, such as cholera, typhoid, influenza, dysentery, etc.

Mechanical and thermal agents, as well as foreign bodies, may also cause inflammation of the endometrium without bacterial infection. Since the clinical and anatomic picture presented by all these forms of endometritis is practically identical, except in the case of tuberculous and syphilitic infection, these last two have been grouped by themselves under the term of “specific,” and the others all classed, as has been said, merely as acute or chronic, the former being characterized by a preponderance of the alterative and exudative changes (cloudy swelling and desquamation of the epithelium, hyperemia, exit from the blood-vessels of plasma and *leukocytes*); the latter, by a preponderance of the proliferative changes (increase of connective tissue, tortuosity of vessels with thickening of their walls, hyperplasia of glands and their extension deep into the musculature, and the infiltration of *round cells*). Albrecht does not consider the plasma cells absolutely characteristic of chronic endometritis, as they may occur without inflammation, and, on the other hand, they are absent in a considerable proportion of inflammatory cases.

Frank¹ has also studied this subject, and thinks that while Hitchman and Adler have performed a valuable service in showing that the majority of changes hitherto usually classed as chronic glandular or interstitial endometritis, are physiologic and not inflammatory in origin, they have gone too far in their conclusions, as we meet with many microscopic pictures in which the cyclic phase does not correspond to the actual time relation to the patient's menstruation. He considers that plasma cells, when present, are an evidence of inflammation, but that their absence does not necessarily indicate that no inflammation is present, as they may be absorbed early in the course of the disease.

The presence of plasma cells in otherwise normal appearing mucosæ shows that inflammation does not necessarily disturb the cyclic changes, nor produce hyperplasia, and no definite proof can be adduced to show that gland hypertrophy or hyperplasia may be caused by inflammation, but evidence substantiates the theory that they are often due to functional ovarian influences. He has been able to find anatomical evidence of inflammation in less than 38 per cent. of his cases, whereas many cases which show anatomically the presence of inflammation give no corresponding clinical symptoms. He thinks, indeed, that the majority of cases which show the conventional symptoms of "endometritis," such as leucorrhea and bleeding, are entirely wanting in demonstrable microscopic signs of inflammation, and we are, therefore, in most cases, obliged to seek for other etiologic factors to account for the symptom-complex hitherto commonly called "endometritis."

Treatment of Leucorrhea. Stocker² says that since 1909 he has been treating all cases of fluor albus, with most gratifying results, by the injection of an anti-ferment, known as "Leukofermantin" (Merck). This treatment is based upon the fact that in every discharge there are large numbers of polymorphonuclear leukocytes, the result of diapedesis from a slowing of the blood stream and of the hyperemia incident to whatever irritation has affected the uterine mucosa. These cells contain a ferment which has a proteolytic action, causing extensive liquefaction of tissue and a purulent discharge. By bringing an "anti-ferment" in direct contact with this ferment, the action of the latter can be neutralized and destroyed, thereby shortening or arresting the purulent process.

The author's method is to thoroughly cleanse the cervix and then introduce into it a strip of guaze soaked in leukofermantin; this is changed the next day, a decided improvement usually being noticed after two or three treatments. In order to control the result, he does not give any douches while the treatment is being carried out. If the fundal mucosa is affected, as indicated by an enlargement of the uterus, 1 to 2 c.c. of the substance may be injected under very gentle pressure

¹ American Journal of Obstetrics, 1912, lxxv, 207.

² Gynæcologia Helvetica, 1911, xi, 160.

by means of a Braun's syringe. The author reports that he has treated 70 patients by this method; of these, 68 per cent. were entirely cured of the discharge, and the others were greatly improved.

Although admitting that a leucorrheal discharge is always a symptom rather than a disease, Nassauer¹ considers that its cause is, in many instances, difficult to determine, and that, even if it can be discovered and treated, the discharge itself, often the most prominent subjective phenomenon, demands active measures for its relief. He considers all the cauterizations of the cervix, uterine injections, vaginal douches, tampons, pastes, ointments, and solutions, which have been used since time immemorial in the treatment of this condition, of no value whatsoever; various yeast preparations have given equally unsatisfactory results in his hands. He calls attention to the fact that the present recognized method of treating superficial wounds and ulcerations of all kinds is to keep them *dry*, large numbers of powders having been brought forward for this purpose. The value of all these is about equal, and results entirely from their absorbent and desiccant action, not from any antiseptic properties *per se*. In the absence of moisture, bacteria cannot thrive; moreover, they become encased in fine particles of powder, and are, thereby, deprived of all motility, the result being death of the bacteria, and healing of the wounds. Why, therefore, should not the same principles be applied in the treatment of inflammatory conditions of the genital organs?

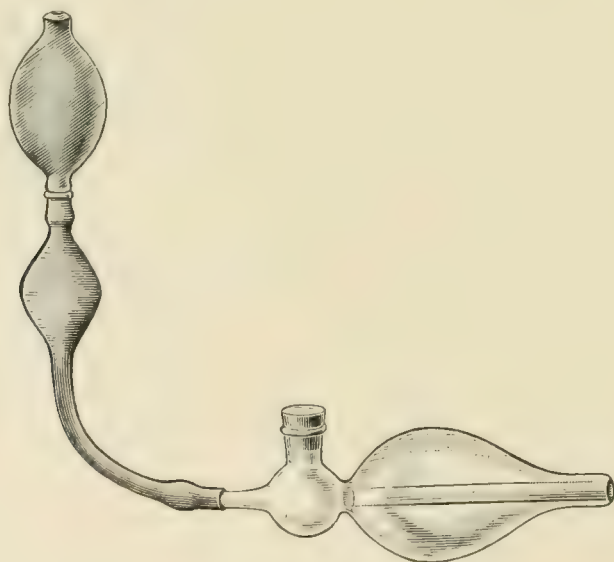


FIG. 49

For this purpose, fine white clay powder (*bolus alba*) is most admirably suited; it is neutral in action, entirely insoluble in water, and exerts no harmful effect in any dose. It possesses great capillary force, causing a rapid dehydration of the tissues with which it comes in contact.

¹ *Annales de Gyn. et d'Obst.*, 1911, xxxviii, 476.

In order to secure its satisfactory application to all parts of the vaginal mucosa, and to as much of the cervical canal as possible, it is necessary that the current of air which carries in the powder shall also fully distend the vagina, conditions which are fulfilled by an apparatus designed by the author, to which he has given the name of "siccator."

It consists, primarily, in a pear-shaped glass bulb for introduction into the vagina, hermetically sealing the introitus; through the centre of this bulb runs a tube, which is enlarged at its posterior end to form a reservoir for a small quantity of powder; to this reservoir is attached a rubber tube and inflation-bulb. The entire process consists merely in introducing the glass pear firmly into the vagina and giving three or four sharp blows with the rubber bulb; it can be done by the patient herself as well as by the physician. This treatment should be carried out at first three to four times a day, later, less frequently.

Nassauer says that he has used this treatment for all sorts of leucorrheal discharges since 1908, his experience with it covering some 300 cases. He has always obtained the very best results, in the majority of instances the discharge having ceased almost immediately after instituting the treatment. While it must be admitted that in some cases merely a symptom has been relieved, this form of treatment is absolutely *curative* for the large and important group in which the discharge is due to infection.

Vaccine Treatment of Gonorrhea in the Female. Heinsius¹ reports the results of vaccine treatment of gonorrhea in 10 cases. All the patients were under twenty-seven years of age; in several, the disease had already existed from one-quarter to one and one-half years, and had resisted other forms of treatment. Treatment was carried out with a polyvalent vaccine obtained from Reiter, whose maximal dose was reckoned at 5,000,000 to 10,000,000 organisms. The first dose given amounted to 0.2 of the maximum, being increased at each subsequent injection by 0.1 to 0.2 of this. The time between injections was regulated according to the effect of each, the passing of the negative phase being judged by a lack of any increase in the discharge or pain, and the disappearance of any rise in temperature. In the majority of cases five to twelve injections were given subcutaneously, treatment being suspended during menstruation.

The end results were decidedly favorable in 9 out of the 10 cases, the single exception being an acute gonorrhea of the vulva and urethra. In all the others, the symptoms were apparently done away with, and the disease brought to a close more quickly than is ordinarily the case, though the author admits that, on the one hand, uncomplicated gonorrhea in women is often cured very quickly without any therapy at all, and that, on the other, it is easy to be deceived by apparent

¹ Monats. f. Geb. u. Gyn., 1911, xxxiii, 426.

results, the disappearance of all symptoms being taken as evidence of a cure, whereas the process is making rapid strides in the internal organs. Most of his cases were followed for some time, however, the results appearing favorable enough at least to justify a further trial of this method of treatment.

Vaccine Treatment of Pelvic Infections. An experience extending over two years in the treatment of every sort of pelvic infection with bacterial vaccines is discussed in a recent article by Polak.¹ During this time 225 cases, both puerperal and non-puerperal in origin, have been treated, with, on the whole, rather encouraging results, these having been best when the process was local, little or nothing having been accomplished, as a rule, in the presence of a virulent bacteriemia. The nature of the organism to be combated was usually determined by a culture from the cervix or interior of the uterus, or from the pus evacuated at operation, it having been found that waiting for a blood culture wastes too much time.

The author states that, in his experience, poor results are obtained from the use of a single strain of autogenous vaccines, and he therefore employs mixed vaccines obtained from reliable laboratories, having found these much more satisfactory. Following the injection of such a vaccine, the leukocyte count generally goes up, accompanied, however, by a reduction in the polynuclear percentage. The initial dose given is usually small, 25,000,000 to 100,000,000 organisms being the average. The blood is counted four hours before, and eight hours after the injection, and subsequent doses are regulated according to the effect produced by the first. The most constant benefits from vaccine therapy have been seen in cases of thrombophlebitis, of pyelitis due to colon bacillus or to a mixed infection, and in suppurative mastitis. In various other conditions, this form of treatment has apparently been of value in individual instances, but has not shown the same uniformity of action as in those just mentioned.

Operative Therapy of Chronic Adnexal Inflammations. Schiffman and Patek² report that, as a result of their experience of the last few years, they have changed their former principle of "Treat conservatively, operate conservatively," to "treat conservatively, operate radically." They treat their cases of chronic salpingo-oöphoritis with baths, compresses, various applications of heat and cold, weights, etc., often using tampons in ambulatory patients, more for their effect in putting the genital organs at rest than for any medicating action. Only patients with fever, large or painful tumors, or those who are refractory after long treatment, are admitted to the hospital and put to bed. In addition to the aforementioned procedures, the authors count vaginal incision of pus sacs among conservative measures. In order for this

¹ Journal of the American Medical Association, 1911, Ivii, 1738.

² Monats. f. Geb. u. Gyn., 1911, xxxiii, 310.

to be of any lasting benefit, it must be accompanied by the insertion of a permanent drainage tube, which may remain in place for several months, only to be removed after complete cessation of suppuration.

If, however, such methods of treatment, continued for months, or even years, are not able to produce a symptomatic cure, some form of operative procedure is resorted to. The authors consider the four chief types of operation which usually come into consideration in the treatment of adnexal disease with regard to their ultimate results: (a) Unilateral salpingo-oöphorectomy, in cases of unilateral disease, or in young individuals with slight hydrosalpinx or tubal adhesions on the opposite side; (b) bilateral extirpation, occasionally preserving one ovary; (c) supravaginal amputation of the uterus with both adnexa; (d) panhysterectomy, with removal of both adnexa—the true “radical operation.”

Aside from the so-called “Ausfallserscheinungen”—*i. e.*, nervous symptoms referable to the complete removal of ovarian tissue—much the best lasting results have been obtained by the authors in those cases in which the radical operation was performed. While 64 per cent. of the cases of unilateral extirpation resulted in cure, this was only true in 38 per cent. of the bilateral ones, and in but 30 per cent. of those in whom a supravaginal amputation was done, whereas 91 per cent. of the radical operations produced satisfactory results. The chief troubles complained of following conservative operations were pain and discharge, these subjective symptoms being usually accompanied by objective findings—bands and masses in the stump. Nothing of this sort was found in a single instance after the radical operation.

Especially unfavorable results were seen following supravaginal amputation, a method which the authors adopted gladly, both on account of its ease of performance, and of the fact that the natural anatomic relations of the vaginal vault are not disturbed by it, advantages, however, which have in their experience been more than overbalanced by the poor results obtained. They do not think the question of being able to leave an ovary behind of great importance, since no one can tell whether an ovary is really healthy or not, or how soon it may, if left in place, give rise to renewed trouble. They have, therefore, come to the conclusion that only the radical operation gives satisfactory results with regard to symptomatic and anatomic cure, and that unilateral extirpation should be strictly reserved for those cases in which retention of the power of conception is expressly desired, the adnexa of one side appearing entirely healthy. They admit that the price of more cases of nervous disturbance, due to removal of both ovaries, must be paid for the greater percentage of cures attained by the radical operation, but believe that the value received is more than worth this cost.

Prophylaxis and Treatment of Peritonitis. As a result of experiments on large numbers of guinea-pigs, Hoehne¹ has advocated the injection into the peritoneal cavity, a few days before the performance of an operation from which peritonitis is especially feared, of a quantity of sterile camphorated oil, a procedure which appears to have been taken up by a number of German operators. In his experiments, Hoehne found that by giving intraperitoneal injections of various oils in suitable doses, a reactive peritonitis was produced, which, if of recent origin, facilitated the absorption of any bacteria that were subsequently liberated in the peritoneal cavity, but after it had existed twenty-four hours or longer markedly hindered, if it did not entirely prevent, bacterial absorption. These statements were proved by the fact that, on the one hand, animals which were subjected to intraperitoneal inoculation of pathogenic bacteria shortly after an injection of oil died more rapidly than those in which a similar bacterial inoculation was carried out without a previous injection of oil; on the other hand, animals to which an oil injection had been given twenty-four hours or longer previous to the inoculation withstood many times the lethal dose of virulent organisms for normal animals. The protective effect of such an artificially produced peritonitis lasts for days and weeks, holding the organisms in the peritoneal cavity, and preventing their entrance into the general circulation. It can be demonstrated that such organisms are destroyed by bactericidal agents within four days. In the peritoneal cavities of non-treated animals, on the other hand, bacterial absorption is very rapid, it being possible, as a rule, to demonstrate the presence in the circulating blood of organisms within three minutes after their introduction into the abdominal cavity.

On the strength of these experiments, Krecke² says that for some time he has been using camphorated oil routinely, not as a prophylactic, but in the treatment of generalized, purulent peritonitis, reporting 11 cases, all due to a perforated appendix, which he has treated in this way. His method is to remove the appendix, sponge out the pus, and then to pour into the abdomen 100 gm. of oil. This is swabbed about with a stalked sponge, a cigarette drain is introduced into the pelvis, and the abdomen is closed. Whether the oil acts by causing a reactionary peritonitis, or merely by mechanically plugging the lymph vessels, he has not determined, but he has had excellent results from this treatment. His patients ranged from eleven months to seventy years of age, and, although there were several severe cases in the series, all recovered, a result which the author believes is attributable to the use of the oil, since in former years his mortality in such cases has been from 34 to 42 per cent., although in every other respect his technique has remained unchanged.

¹ Arch. f. Gyn., 1911, xciii, 561.

² Monats. f. Geb. u. Gyn., 1911, xxxiii, 473.

A treatment of peritonitis, based on entirely different principles, has been suggested by Kuhn.¹ After very extensive and painstaking researches, whose results are detailed in an article covering more than 125 pages, this author has come to the conclusion that we possess in sugar a substance which has a most powerful influence on intra-abdominal processes, exerting on the peritoneum a number of remarkable and beneficent effects, which, in view of its absolute harmlessness, should strongly recommend it for therapeutic purposes. The chief actions which he claims for it are as follows:

1. It hinders or completely abolishes coagulation of fibrin, thus facilitating discharge, increasing the effects of drainage, and preventing the formation of residual abscesses.
2. If employed in hypertonic solutions, it stimulates secretion.
3. It prevents the formation of alkaline, hemolytic, and toxic products, and exerts a protective action on the endothelium.

The action of sugar is purely biologic, and should not be confused with that produced by other forms of treatment that have been suggested, such as the introduction of oil or other foreign substances into the peritoneal cavity for the purpose of causing irritation.

The author's method of applying his treatment is first to wash out the peritoneal cavity with a 4 per cent. solution of grape sugar in physiologic salt solution, and then to introduce through cylindrical specula inserted into the deepest portions of the abdomen a considerable quantity of a somewhat stronger sugar solution, which is allowed to remain, permanent drainage being secured by means of straight glass tubes with large lateral openings.

The Appendix in its Relation to Gynecological Conditions. Legueu² says that he removes every appendix when the abdomen is opened, whether it appears diseased or not, provided its seeking and removal do not seriously increase the danger of the operation. He has found that a large majority of appendices removed in conjunction with right sided or double tubal disease show peritoneal lesions, and about two-thirds of them mucous and submucous changes as well. The peritoneal lesions are generally acute, and consist chiefly of a lymphangitis; the mucous and submucous changes are generally chronic, but in some instances these also are acute, and are evidently secondary to the peritoneal inflammation. Appendices removed in connection with other gynecological operations than those performed for tubal disease rarely show any changes that can be brought into direct relationship with the gynecological condition. The author believes that, in practically all cases of adnexal disease, inflammation extends from the tube to the appendix by the peritoneal and subperitoneal route, causing lesions which demand the removal of the appendix, whether it

¹ Arch. f. klin. Chir., 1911, xevi, 759.

² La Gynécologie, 1911, xv, 145.

presents macroscopic evidence of disease or not, and no matter whether or not there have been any clinical symptoms indicating its participation. He thinks it is well always to remove the appendix on prophylactic grounds if no special contraindication is present, although this is not so important in other gynecologic conditions as it is in tubal affections.

Tuberculosis of the Female Genital System. An extensive statistical study of the occurrence of tuberculosis of the peritoneum and urogenital system in the female has been made by Schlimpert,¹ who has studied for this purpose the records of 3514 carefully performed autopsies, mostly of women from the lower classes in Dresden. He found macroscopic evidences of tuberculosis of some organ or organs in 62 per cent. of these bodies, and in no less than 29 per cent. of them was a tuberculous process to be considered the cause of death. The lungs were naturally more frequently affected than any other organ, being involved in 84 per cent. of all tuberculous cases. The intestine was found to be the organ next in frequency, with 32 per cent. involvement, then the peritoneum, with 5 per cent., and the genital system, with $3\frac{1}{2}$ per cent. The urinary system was found affected in but $1\frac{1}{2}$ per cent. of the cases.

Peritoneal tuberculosis was found chiefly in conjunction with severe forms of the disease affecting other important organs, such as the lungs, intestine, meninges, etc., not a single case of isolated tuberculous peritonitis being found in the entire series.

Genital involvement was found, as has been said, in about $3\frac{1}{2}$ per cent. of the tuberculous cases, and in about 2 per cent. of *all* the female bodies autopsied. It occurs chiefly from the twentieth to the thirtieth year, as is shown by the following table:

1-10 year	1 case	=	1.4 per cent. of all cases of genital tuberculosis.
11-20 year	6 cases	=	8.2 per cent. of all cases of genital tuberculosis.
21-30 year	24 cases	=	32.9 per cent. of all cases of genital tuberculosis.
31-40 year	13 cases	=	17.8 per cent. of all cases of genital tuberculosis.
41-50 year	13 cases	=	17.8 per cent. of all cases of genital tuberculosis.
51-60 year	6 cases	=	8.2 per cent. of all cases of genital tuberculosis.
61-70 year	5 cases	=	6.8 per cent. of all cases of genital tuberculosis.
71-80 year	4 cases	=	5.5 per cent. of all cases of genital tuberculosis.
81-90 year	1 case	=	1.4 per cent. of all cases of genital tuberculosis.

In not a single instance was an isolated, primary genital tuberculosis found, but in every case, somewhere else in the body, there were active or healed foci; in the vast majority of cases, the genital infection appeared to have been hematogenous, though in two instances it was due to a direct extension from a tuberculous intestine, and once probably from a tuberculous bladder.

Among the 73 cases of genital tuberculosis were 7 involving the vagina. In all these it was the only portion of the genital tract affected;

¹ Arch. f. Gyn., 1911, xciv, 863.

the infection appeared frequently to have arisen by extension from neighboring organs (bladder, rectum), and in no instance did sexual intercourse appear to have been responsible. The cervix was involved only three times, always in combination with severe general tuberculosis affecting other portions of the genitalia as well; in two of the cases the peritoneum was involved, and, in the third, childbirth appeared to have played an etiologic rôle. Uterine tuberculosis occurred more frequently, being found 41 times altogether, and 11 times unassociated with involvement of other of the genital organs. In two of the latter cases, infection was shown to have taken place from the placenta. Involvement of the uterus was exceeded in frequency only by that of the tubes, which were found diseased 51 times altogether, alone 21 times. It is evident, that in the majority of cases, genital tuberculosis finds its origin in these organs, being introduced both here and in the uterus almost always by means of the blood stream. Ovarian tuberculosis was found ten times, only twice unassociated with disease of one of the other genital organs. In most of the cases, the tubercles were found in the interior of the ovary, associated with involvement of the uterus; it could not be determined in these cases whether infection had occurred by way of the blood or lymph vessels.

With regard to the prognosis of genital tuberculosis, the author says that he was unable to find a single case in which this condition was the direct cause of death, and only two in which it may possibly have been the indirect cause, by giving rise to a peritoneal inflammation. He believes that a tuberculous infection of the peritoneum from the genitalia occurs much less frequently than the reverse process, and that it is questionable if it occurs at all. In most instances, therefore, genital tuberculosis is to be considered merely a secondary condition, coincident to a lethal process in other organs, and consequently of subordinate clinical importance.

A study of the same subject from an entirely different standpoint has been made by Meyer,¹ who, however, has arrived at somewhat similar conclusions. His observations cover 40 operative cases of tuberculosis of the lower abdomen, in about half of which the chief involvement was in the adnexa, in the other half in the peritoneum. In the former cases the adnexa usually formed good sized masses, whereas there was no trouble in the peritoneum other than the presence of adhesions; in the latter group, however, the peritoneal involvement was marked, being often associated with ascites, but the adnexa showed, at most, small swellings or nodules, and it seems probable that in most of these cases the peritoneal condition was the primary one.

Meyer does not believe that tuberculous peritonitis is very apt to develop early in the cases where the primary involvement is of the

¹ Gyn. Rundschau, 1911, v, 716.

adnexa, as in many of his cases the tubal condition had existed for a long time without any evidence of a tendency to spread to the peritoneum. This is very important from the therapeutic standpoint, as most of these patients are under thirty years of age, and attempts should be made to cure the condition without operation, if possible, it being perfectly safe to give such treatment a thorough trial without fear of a tuberculous peritonitis arising. If operation becomes necessary, pains should be taken to preserve a portion of one ovary, even if this may necessitate a second operation later on.

The author has found that cases where the chief involvement is peritoneal come to operation, as a rule, earlier than the others, the reason being that a marked swelling of the abdomen usually occurs, this causing the patient to seek advice. Notwithstanding this, the mortality in these cases is much higher, even though nothing is done but to open the abdomen and drain off the fluid, than it is in the adnexal ones, where a much more extensive operation is usually performed. He has found the prognosis, both as regards primary healing of the wound and operative mortality, very bad in patients with fever, and considers this, therefore, a serious complication, as he also does the presence of lung lesions, which usually are unfavorably influenced by operation.

The Question of Marriage and Offspring in Tuberculous Women, with the Results of Tuberculin Therapy. Petruschky¹ regrets that in most discussions of this important subject, one of the most valuable resources of modern science, specific therapy, has been almost entirely neglected. He reports having applied this for the last twenty years in all cases which appeared at all suitable, especially in those for whom sanatorium treatment was out of the question on account of its cost; in many of these, the possibility of having eventually to send the patient to a sanatorium was held in reserve, but it was found that this could always be avoided, and the treatment carried out without interfering with the daily activities of life.

His report is based on the observation of 40 cases, divided into four general classes.

1. Women with "open" tuberculosis, *i. e.*, with tubercle bacilli in the sputum. Of 16 such cases, in whom treatment was begun before, during, or just after delivery, 8 were permanently cured, 5 died, 3 are still under treatment.

2. Girls with open tuberculosis, who married after the disappearance of all symptoms. But 2 cases of this class were observed; one of these remained well, and now has a daughter, aged nine years, the other died from a recurrence of the tuberculosis before becoming pregnant. Of the 18 cases in these two groups, therefore, 50 per cent. were perma-

¹ Monats. f. Geb. u. Gyn., 1911, xxxiii, 531.

nently cured. There occurred among these women 19 pregnancies; one was interrupted by the production of abortion, 7 children died soon after birth, 11 are alive, and with three exceptions, free from tuberculosis (cutaneous reaction).

3. Women with closed tuberculosis. Eight cases were permanently cured; a ninth showed a recurrence and died immediately following a puerperium.

4. Girls with closed tuberculosis. Thirteen such cases were treated; all married after becoming apparently cured. Ten of these have given birth to healthy children, while 3 have not, as yet, become pregnant. All the patients themselves have remained well. Of the 22 cases in the last two groups, therefore, 95.5 per cent. were permanently cured; 6 of the women have given birth to two children each, 12 others, to 1 each; one has aborted once. Of the 24 children, all are alive, and so far as tested, react negatively to tuberculin.

As a result of these exceedingly interesting observations, the author comes to the conclusion that many of the supposed dangers resulting from the marriage of tuberculous women may be circumvented by proper precautions, such as the prompt interruption of pregnancy when this condition is manifestly exerting an unfavorable influence on the course of the tuberculosis, and timely treatment of the disease, before marriage if possible, if not, before conception occurs (possibly employing means to prevent this), or during a pregnancy that has already begun. Children resulting from such marriages should be under very careful observation, and should be subjected to occasional tuberculin tests, and to early treatment if signs of trouble appear.

With regard to methods of treatment, the author depends chiefly on hygienic-dietetic measures in combination with specific tuberculin therapy. He believes that the existence of pregnancy offers *per se* no contraindication to the latter, but that it can be carried out with no danger to mother or child if precautions are taken to avoid marked temperature reactions.

MENSTRUAL DISORDERS

Menstrual Disorders of Obscure Origin. Coe¹ writes an interesting paper on menstrual disorders of obscure origin. He says that it would seem as if the last word had long ago been spoken about dysmenorrhea and menorrhagia and metrorrhagia, especially when considered from the ever-popular standpoint, but every candid man must admit not only his ignorance with regard to the etiology of these familiar symptoms, but his disappointment at the frequent failure to relieve them by the

¹ American Journal of Obstetrics, lxiii, 790.

approved methods of treatment, which have been taught and practised for many years.

After recalling the trite saying that we learn more from failure than from success, and the old-fashioned conservatism which led the boldest surgeons to hesitate to decide to perform a serious operation after a single interview with the patient, he asserts that we have sometimes resorted to surgery, when the result has proved that we did not recognize the true cause of the symptoms which we sought to relieve.

Coe dwells upon the mysterious nature of the menstrual function, and some of its variations which are difficult to interpret. He calls to mind those cases of dysmenorrhea which are exposed to a succession of operations without result. The case, for example, of an unmarried woman with a slightly anteфлекed uterus and a palpable ovary—neurotic, and exhibiting associated gastro-intestinal symptoms; to what category shall be referred the pains which attend menstruation, before, during, or even a week after the flow? She has long been treated by her physician, has probably had a course of tamponade and hot douches, colon irrigation, etc., and has received a variety of opinions. Her appendix has been condemned, her ovary regarded as the offending organ, and, of course, divulsion and curettement have been recommended. Examination under anesthesia throws no light upon the etiology.

Finally, the cervix is dilated or incised, the curette is used with negative results. Apparently, the so-called "obstruction" has been satisfactorily overcome. "Defective drainage," "atrophy," etc., though recognized explanations do not help us, for so far as we can determine the uterus is quite normal.

For two or three months she is relieved, then the pains recur as before. The abdomen is opened, and a prolapsed (otherwise normal) ovary is sutured in position, perhaps a few cysts are punctured and a normal or slightly diseased appendix is removed. The effect of the more serious operation is greater, but eventually the patient's latter state is the same as at first, or is worse. This is a common picture. Where is the trouble? Was it a mistake in diagnosis; were the operations ill-advised? These are questions which are presented to us all, and to Coe's mind we seem to be little nearer a solution than we were twenty years ago, though, fortunately, we have learned better than to remove *both* ovaries, as was the custom with a former generation.

To avoid the disappointment which attends such an experience, the author advises the observation of patients long enough before distinct advice is given, to become thoroughly acquainted with their peculiarities. He takes up the influence upon menstrual disturbance of ungratified sexual desire or of perverted habits, and also the sexual hygiene of married women. It is time, he says, that we handle certain questions of sexual hygiene in married women "without gloves." We shall never get at the real cause of obscure pelvic troubles until we pay

more attention to the disagreeable subjects of excessive and imperfect marital relations, prevention of conception, and induced abortion. Whether we regard it as moralists or gynecologists, the lax modern views of the community may well arouse our serious thought. It is a delicate and a difficult matter to probe, but it must be done in the interest of science, and Coe is sure that we need not look to surgery to relieve either dysmenorrhea or irregularities of the flow, when these disturbing factors are constantly present.

He draws attention to the inability of the gynecologist to explain a sudden cessation of menstruation in women, married or single, previously quite regular and accompanied with no other symptoms, and, to further mystify the gynecologist, the resumption of the menstrual flow after from two to six months spontaneously, and after every variety of treatment, both medical and surgical, had been tried in vain. He summarizes his article as follows:

In many cases of painful menstruation, we are unable to discover any local cause for the symptom, either by the most careful examination, or at the operating table. The fact that the dysmenorrhea is not due to minor palpable changes in the uterus or ovaries is proved by the fact that they are not permanently relieved by operation. The conclusion is forced upon us that such cases belong to the neurologist rather than to the gynecologist. Hence, the propriety of a careful observation of the patient, a guarded prognosis, and less frequent resort to operation before fair trial has been made of local and general treatment.

Irregularities of the menstrual flow, whether oligo or amenorrhea, meno- or metrorrhagia, may be unaccompanied with discoverable pathological conditions—either local or general—and resist the ordinary methods of treatment, both surgical and non-surgical. While exploration of the uterine cavity is always legitimate under proper indications, too great reliance cannot be placed either upon the curette or the usual medicinal treatment. Radical operations would naturally be limited to intractable cases, especially in women near, or past, the climacteric.

Nasal Treatment of Dysmenorrhea. Brettauer¹ speaks of those unfortunate women, who, without presenting any palpable organic changes, suffer intensely at each menstrual period. Cases of this nature, which are commonly referred to ovarian or neurotic origin, have been the subject of a trial by Brettauer, of the recommendations made by Fliess, in 1893. The treatment is based upon the biological fact that in the animal kingdom there exists a definite connection between the sexual organs and the nasal mucous membrane.

Anatomically, a similarity is found in the presence of so-called erectile tissue in both regions. In the nose it is most marked at the anterior end of the lower turbinated, and higher up, in a small cir-

¹ Transactions of American Gynecological Society, 1911, p. 377.

cumscribed area, the tuberculum of the septum. Accurate observers have shown that these two areas, which Fliess called "Genitalstellen," and which may be termed genital spots, are invariably swollen, more prominent, bleed more readily upon slight touch, and are exceedingly hyperesthetic during menstruation. All these characteristics disappear with the termination of the menstrual period. The connection between the sexual organs and these genital spots must be looked for in the sympathetic system, with which the mucous membrane of the nose is connected through the nervous petrosus profundus, by way of the sphenopalatine ganglion.

With Fliess originated the term "nasal dysmenorrhea," which he applied to all cases in which menstrual pain is influenced by the so-called cocaine experiment. This consists of the application of 20 per cent. cocaine solution to the genital spots. Within a short time—a few minutes only—pain in the back and in the hypochondrium disappears in all cases in which no obstruction or organic lesion is found.

Where there is an obstruction within the uterine canal, a displacement of the uterus, a neoplasm, or an inflammatory condition, any one of which may be a causative factor in the production of pain, the application of cocaine does not relieve. By the use of this drug one can differentiate between the dysmenorrhea of local origin and those caused by factors unknown to us, which have previously been attributed to disturbances in the nervous system. The latter cases form the material upon which this paper is based, and for which this treatment is advised.

If the result of the cocaine experiment proved positive, and the patient was temporarily relieved by the application, permanent relief was then secured in many instances by cauterization of the genital spots, either with the galvano-cautery, bipolar electrolysis, or with trichloroacetic acid, or by any measure required for the relief of abnormal nasal conditions.

When Brettauer first followed the suggestion of Fliess, he obtained no result because he employed a faulty technique. Schiff later endorsed and enlarged the claims made by Fliess. He found that by touching only the anterior part of the lower turbinate with cocaine the pain in the hypochondrium disappeared, and that the backache was controlled by the applications to the tuberculum of the septum. Irritation of either of these spots with a probe, reproduced the same pain which shortly before had been inhibited by cocaine. The result of such treatment has been attributed to suggestion, but in a very striking case, reported by Opitz, in which a neoplasm obstructed the nose of a young woman who suffered intensely, it was followed by complete relief. The author then proceeds to report four cases in which this treatment was followed by excellent results.

Anteflexion of the Cervix and Spasm of the Uterine Ligaments.

Reynolds¹ has developed an interesting line of thought upon anteflexion of the cervix and spasm of the uterine ligaments in relation to retroversion, dysmenorrhea, and sterility. He starts out by calling attention to the fact that all the structures which support the uterus are, at the present time, known to be more muscular and less ligamentous in character than has been commonly supposed. The most rigid and least muscular of the uterine attachments are the anterior ones of the cervix.

Reynold believes that the muscular supporting structures, the so-called uterine ligaments, play a more important part in the production of pelvic disorders than has been usually supposed. From a study of text-books of anatomy, the following statement may be made concerning the muscular constituents of the uterine ligaments and supporting tissues. Muscular tissue is found sparingly throughout most of the pelvic connective tissue, and exists in especially important quantities in three situations, throughout the uterosacral ligaments, at the base of the broad ligaments, and along their upper edges.

In the base of the broad ligaments it follows in a general way the course of the uterine vessels, but radiates out in widespread insertions along the pelvic wall and into the vault of the vagina and the sides of the cervix. It is here especially abundant. In the upper part of the broad ligaments we find the round ligaments, and an almost equally important, though less easily demonstrable, muscular mass, which follows the course of the ovarian vessels. The space within the uterosacral folds contains connective tissue, lymphatics, and much unstriated muscular fiber.

Though these three groups of muscular tissue are demonstrable postmortem mainly by serial microscopic sections, their action, and even their mass is usually recognizable during life, *i. e.*, during operation, and they are, therefore, probably familiar to every operator who has given any thought to their existence and importance. Their origins and insertions must be carefully remembered in estimating their action.

In estimating the action of the broad ligaments, we must remember that they are narrow at their uterine insertions, but are widespread at their origins against the pelvic wall. At their upper margins the contained round ligaments (or muscles) and the muscular bundles which accompany the ovarian vessels spread widely forward and backward, but must, in combination, exert a lateral traction. The round ligaments tend to draw the fundus forward. The infundibular or ovarian bundles tend to draw the fundus backward. When these muscles act in combination, their resultant is lateral, but the possibility of their individual action must be remembered.

¹ Transactions of the American Gynecological Society, 1911, p. 387.

At the base of the broad ligaments, the very strong bundles of muscular fibre which follow the uterine vessels spread out into similar fan-shaped expansions, and must, as a whole, exert a similar lateral traction. The resultant of the comparatively unimportant fibers which are scattered throughout the broad ligaments, is probably essentially the same.

The uterosacrals are attached, or their most active part is attached at about the cervicocorporeal junction. When in joint action their resultant is directly backward, but spasm of one uterosacral with relaxation of the other (usually in conjunction with spasm of the base of the broad ligament on the same side), is a phenomenon of frequent clinical importance. The possibility of this unilateral action should, therefore, be borne in mind.

The anterior attachments of the supravaginal cervix are also structures of great importance to the support of the uterus. There is, in fact, a large mass of muscular fiber surrounding and supporting the base of the bladder. These fibers are attached anteriorly to the pelvic walls, and posteriorly to the anterior and lateral surfaces of the cervix and vagina. The most noticeable bundles, and their connective tissue accompaniments, have long been described as uterovesical *ligaments*, but their muscular character has not been sufficiently emphasized. The insertion of the anterior vaginal wall into the cervix is also a uterine attachment of much importance. This wall is largely non-muscular, and is attached at one end to the cervix, and at the other to the arch of the pubes.

During his clinical work, Reynolds has been impressed by the difference which he has found in examination of the same patient, with and without anesthesia. A comparison of the conditions present before and after, will often reveal pathological spasm. This pathological spasm frequently affects the uterosacral ligaments, the rigidity and the shortening disappearing under anesthesia. Reynolds has frequently noted lateral displacements of the uterus affecting the fundus or the cervix alone, or the uterus as a whole, which disappeared under anesthesia.

The author has also noted many cases in which an examination, without anesthesia, showed very sharp ante flexion of both the cervix and the body of the uterus, whereas, under anesthesia, the body would be found in more or less of a normal position, or even in slight retroversion.

The anterior attachments of the cervix are more rigid and less muscular than any of the other structures. In congenital ante flexion of the cervix, there is often an arrest of development, in which a persistence of an underdevelopment of the cervix itself is associated with an underdevelopment of the anterior vaginal wall and of its attachments to the surrounding structures. This congenital abnormal condition is

frequently much exaggerated by a spasm of the muscular supports of the uterus, so that some cases with this faulty development present symptoms, while others do not.

The author details the underlying anatomical points and the variations from the normal of the cervical attachments. (1) It must be remembered that the mass of unstriped muscular fiber which underlies the base of the bladder is attached posteriorly to the vault of the vagina and the supravaginal cervix, and anteriorly to the descending rami of the pubes. (2) The more important part of this muscle is inserted at the vault of the vagina into the anterior vaginal wall, which is itself normally attached to the cervix at a point much lower than the uterosacral muscles which oppose it, and in cases of conpubertal ante flexion, it is usually attached to the extreme tip of the cervix. (3) An all-important point is that in this developmental anomaly the anterior vaginal wall is also uniformly underdeveloped, *i. e.*, is short and usually narrow, and that this wall is a strong structure, which, in the non-pregnant state, is mostly composed of white connective tissue, and which is attached firmly by its lower and forward end to the tissues about the descending rami. (4) The fundus of the uterus is held forward, as has been pointed out, by structures which are almost exclusively muscular. (5) The uterus itself is not a rigid but a muscular and, therefore, elastic body, which is capable of an increasing or decreasing flexion under the play of the surrounding forces.

If these points are borne in mind it will be seen at once that the small pointed and anteriorly deformed cervix is not only structurally held forward by the short anterior wall and its attachments, but that any irritation which results in a spasm of the mass of muscle, which is usually summarized under the name of the uterovesical ligaments, must result in an increase of this forward deformity; that, owing to the attachment of the uterosacrals to the uterus at a point above the attachments of these anterior muscles, whenever a spasm of the uterovesical (or more properly pubovaginal) muscles is opposed only by a spasm of the uterosacrals, unparticipated in by spasm of the round ligaments, the couple (to use mechanical language) so formed must result in a tendency to backward displacement of the upper pole of the uterus, the fundus; while if the round ligaments are also in spasm, a double couple is produced, and results in increased ante flexion of both cervix and body. These theoretical conclusions from known anatomical facts certainly correspond with the clinical observations which have been mentioned.

They also offer an explanation of the relations of ante flexion of the cervix to dysmenorrhea, sterility, and the production of retroversion.

DYSMENORRHEA. If it be true that in the cases in which ante flexion of the cervix is associated with dysmenorrhea, this alteration in the shape of the organ is partly the result of an organic (developmental)

vice of shape, and partly the result of an exaggeration of that vicious shape by spasm of the muscular supports of the organ, it is necessarily true that even during the intermenstrual interval there would be some approach to an obstruction of the lumen of the uterocervical canal, such as is produced by making a sharp bend in a rubber tube, and still more true, that, with the approach of the catamenial congestion, which increases the tension within the uterine walls, this obstruction of the lumen would be of necessity and mechanically increased.

Intermittent or constant partial obstruction of the menstrual flow would, therefore, exist even in a canal which readily permits the passage of a uterine sound, and this would go far to explain the dysmenorrhea; but it is not wholly necessary to invoke this obstructive condition, for throughout the body pressure is pain, and increased pressure must, of necessity, exist at the point where a tube is bent upon itself.

In some cases, at least, this point may be an adequate explanation for a part or for all of the catamenial pain in the condition which has so long been described as obstructive dysmenorrhea.

STERILITY. Sterility in the same class of cases, Reynolds believes, is more likely to be the result of alterations in the condition of the endocervical mucous membrane caused by partial retention of the catamenial flow and the intermenstrual secretions of the uterine cavity, than a merely mechanical matter.

RETROVERSION. That a forward fixation of the cervix may predispose to retroversion is considered self-evident by Reynolds. He says that if both the fundus and the cervix are held forward, while the junction between the cervix and the body is held backward by the uterosacral attachments, it follows that, as the attachments of the fundus are more exclusively muscular and more capable of relaxation than those of the cervix, the pull backward would predispose to retroversion of the fundus.

It would also hold true, *a priori*, that if the structures which hold the cervix abnormally forward are organically, *i. e.*, developmentally, shortened, any considerable motion of the uterus, such as results from forced use of the abdominal muscles, or from falls or other accidents, would be exerted chiefly upon the fundus, which is subject to the normal freedom of movement while the cervix is abnormally fixed; *i. e.*, there would again be an inevitable tendency toward the production of retrodisplacements from slight causes.

Reynolds has found some degree of ante flexion, or, as he calls it, conpubertal forward fixation of the cervix, in between 10 and 20 per cent. of his cases of retroversion. At the present time he performs an operation for ante flexion of the cervix which aims to get rid of the abnormal forward fixation of the cervix, and he does this now as a preliminary to operations for retrodisplacement.

The *operation* he describes as follows: After a preliminary dilatation

and curettage the length of the cervix from the external os to the point of flexion is carefully measured, and the posterior lip of the cervix is divided with scissors in the median line up to this point. The angle between the line of the cut and the edge of the external os on each side is then sutured into the extreme upper end of the cut, after the manner of Dudley's method of discission of the cervix, although he has habitually used two sutures, one on each side, in place of the somewhat complicated suture which Dr. Dudley originally described.

Reaching the actual angle of flexion by both cut and sutures is the first essential point in the operation. The anterior lip of the cervix is then seized by a volsellum and drawn strongly backward, putting the anterior wall sharply on the stretch. The vaginal wall is then divided transversely with the knife, just in front of the cervix, the cut being usually just wide enough to admit a finger, and carried completely through the vaginal wall with knife and scissors, exposing the bladder. The finger is then passed into this cut and the bladder freed from the vagina and cervix well up along the anterior surface of the uterus. A similar blunt dissection with the finger separates the anterior attachments of the vault of the vagina and base of the bladder, well out to each side.

That this separation should be made laterally extensive, and also carried above the angle of flexion, is the second essential point in the operation.

The edges of the vaginal wound are then brought together by transverse sutures, nothing but the vaginal wall being included in their grasp, thus elongating the anterior vaginal wall. There is usually somewhat profuse bleeding from the divided vaginal wall until the sutures are inserted. If the blunt dissection is done with reasonable skill, there is no other bleeding.

Resection of Nerves as a Treatment of Dysmenorrhea. Harris¹ divides dysmenorrhea into three groups according to the cause: (1) Those due to a generally deranged condition of the patient; (2) those due to abnormalities of the uterus; and (3) those due to diseased conditions of the tubes and ovaries, the latter organs being grouped together because the ovaries and the inner three-fourths of the tubes have the same nerve supply.

In the third group of cases there may be gross pathologic lesions, such as cyst or abscess, or the organs may be apparently normal or nearly so, and it is under such circumstances that the so-called ovarian type of dysmenorrhea is found, a condition which is denied by many, but of whose existence the author is convinced. The pain is usually premenstrual, gradually subsiding as the flow is established. On examination nothing is found except tenderness, sometimes very acute,

¹ Journal of the American Medical Association, 1911, lvi, 1104.

in the region of the ovaries. It is this class of patients preëminently that resort to all manner of anodynes for relief, and finally become confirmed neurotics.

In the hope of relieving them, Harris originated the idea of resecting the nerves which supply the ovary. They are altogether sympathetic in character, and are derived from the spermatic plexus; they can be easily approached in the upper part of the infundibulo-pelvic ligament, where they lie close together, accompanying the ovarian vessels. An incision is made in the free border of the ligament; the two layers of peritoneum are pushed aside by blunt dissection, the tissues of the ligament secured by two catgut ligatures, and about 2 to 3 cm. resected between them. The operation is completed by closing the incision along the edge of the ligament. The resection is, of course, done on both sides if the pain has been bilateral.

In the portion of tissue thus removed are included the nerves as well as the vessels of the ovary. Care must, of course, be taken not to grasp so much tissue as to endanger the ureter. As a result of the operation, the ovaries and the inner parts of the tubes are rendered anesthetic, so that they can no longer give rise to painful sensations. It goes without saying, that this method of treatment is applicable only to those cases of dysmenorrhea which are ovarian in origin, with no demonstrable pathologic lesions; in them it gives the greatest relief.

The author has employed his method in more than 20 cases, with extremely gratifying results. In no instance has any other effect than relief of pain been noted, the sexual and reproductive functions being entirely undisturbed.

Dudley's Operation for Dysmenorrhea and Sterility. Brickner¹ reports a review of 73 cases of Dudley's operation for dysmenorrhea and sterility. After describing the technique of the operation, which need not be repeated here, as it is well known, the author says that the operation has been performed 106 times in the last six years. It has been modified in four ways. The principal modification has been the omission of the denudation of the anterior wall, which he has not considered essential to the proper development of the operation, and which Dudley also now dispenses with.

The second has been the occasional but infrequent omission of the excision of the wedge-shaped piece of the posterior lip of the cervix. The third consists in the wide dilatation of the cervix, which renders the operation easier; and the fourth consists in using chromicized catgut, where Dudley employs silkworm gut to close the cervical wound.

The author says that one of the direct results of this operation is a change in the position of the external os. Instead of lying against the anterior vaginal wall, if the uterus is in sharp anteflexion, or midway

¹ Surgery, Gynecology, and Obstetrics, 1911, xiii, 510.

between the anterior and posterior vaginal wall, if the uterus is moderately anteflexed, it now points toward the posterior wall. In this way the reception of the semen into the uterus is very much fostered; for, as many writers have pointed out, if the cervix lies against the anterior wall, access of the semen to the uterus is practically excluded.

Another and a striking result, is the change which takes place in the curve of the uterine canal. Whereas before operation the uterus lay in exaggerated anteflexion, with a most marked curve, as soon as the suturing is completed the sound will be found to follow practically a straight course toward the fundus. It is easy to understand why this should be so, for the entire direction of the lower portion of the uterus is changed, the cervix pointing directly backward.

The cases operated upon by Brickner, Brettauer, and Frank were carefully selected. In every instance, an examination of the husband was made to preclude the possibility of his being responsible for the sterility. Contraindications were observed in both the cases of sterility and dysmenorrhea. No patient was subjected to the operation who had ever had inflammatory pelvic disease, or in whom there was any gross pathological condition of the pelvis, or in whom there was diabetes, nephritis, tuberculosis, or grave cardiac disease.

They have not considered a contracted pelvis as a contraindication, as patients with this condition can be properly taken care of when they become pregnant. A few of the patients had small, hypoplastic uteri; but, although an infantile uterus does not offer a promising result, it was not looked at as a contraindication to operation, since it might give relief to the dysmenorrhea for which the patient came to the hospital. Many of the patients suffered from a non-specific form of endocervicitis, which has been recognized by Kelly as a source of dysmenorrhea.

The majority of patients gave microscopic evidence of a chronic endometritis, although very few complained of leucorrhea. In general, the patients presented themselves with a history of mere sterility, dating from eight months to twelve years. They complained of nothing else. In the ward patients this was a serious complication of married life, for most of them were Russians or Poles; and if they remain barren, they are eventually deserted or divorced by their brutish husbands. The other general class of patients complained only of dysmenorrhea, varying from slight pain to severe agony. Many of the married women sought relief from both dysmenorrhea and barrenness.

The usual finding was a small, anteflexed uterus with a long, conical cervix. In many instances, the external os could not be passed by a sound. This constituted, in the absence of the contraindications above noted, an indication for the Dudley operation.

In response to a circular inquiry sent to the 106 patients, answers were received from 52 ward patients and 21 private patients, a total

of 73. Of 52 ward patients, 29 applied for the relief of dysmenorrhea, and 29 for dysmenorrhea and sterility; 55 per cent. were relieved of dysmenorrhea, 17 per cent. were relieved of sterility. Of 21 private patients, 13 had complained of dysmenorrhea, and 19 had complained of dysmenorrhea and sterility. The dysmenorrhea was relieved in 84 per cent., and the sterility in 42. Averaging the ward and the private patients, 64 per cent. were relieved of dysmenorrhea, and 27 per cent. were relieved of sterility.

MEDICINAL OR NON-OPERATIVE TREATMENT

Acute Vulvitis and Vaginitis. Young¹ recommends the application of *crude pyroligneous acid* to the external genitalia and vaginal canal in cases of acute vulvitis or vaginitis. He also mentions the use of two ounces of *peroxide of hydrogen*, introduced into the vagina by the patient five minutes before taking a douche. The peroxide loosens the discharge and favors thorough cleansing.

Pruritus Vulvæ. Schubert² reports great success in the treatment of certain cases of this at times very troublesome condition, by the following simple procedure which he carries out in his office. He makes an epidural injection into the sacral canal of about 1½ c.c. of the following solution:

Cocaine hydrochlor.	0.1
Beta-eucaine	0.1
Sod. chlor.	0.4
Aq. dest.	200.0

In very severe cases an equal quantity of the same solution may be injected into the region of the tuber ischii, where the pudic nerve, which supplies the vulva and vestibule, comes to the surface. The author reports the complete cure by this method of 2 cases of very severe idiopathic pruritus, in which all ordinary therapeutic measures had been thoroughly tried without avail, and says that in 25 other similar cases, he has had, on the whole, very brilliant results. He believes that the factor of suggestion can be definitely excluded in all these cases, as in many instances various other forms of treatment had been tried, and had not produced any results; he believes, therefore, that the effect is due to a direct action of the anesthetic on the roots of the pudic nerve.

Treatment of Vaginismus. Funck-Brentano³ states that he has found the ordinary *Champetier de Ribes bag*, such as is used in obstetric

¹ American Journal Obstetrics, lxiii, 30.

² Münch. med. Woch., 1911, lviii, 745.

³ La Gynécologie, 1911, xv, 633.

work, much more efficient in the treatment of vaginismus than are the specula and dilators usually employed in this condition. He first anesthetizes the patient, and then introduces a bag of 5 to 6 cm. diameter into the vagina by means of the regular inserting forceps. The bag is then slowly and gradually dilated, great care being taken to avoid tears of the vaginal walls, as the dilatability of the parts is much less than in pregnancy. The bag, having been completely filled, is pulled upon, so that the perineum bulges and the hymen, stretched over the protruding portion, can be very easily excised.

After carefully extracting the first bag, a second one, having a diameter of 7 to 8 cm., should be introduced and inflated in the same manner. This bag must be extracted with as much care as is used in delivering the fetal head, the danger of tearing the perineum being considerable if undue roughness or haste is employed. After the extraction of this bag, the vaginal outlet presents the same appearance as it does immediately postpartum, so that a manual examination should be made to ascertain if, in spite of all precautions, any slight tears are present which require suturing. The vagina is now tamponed with gauze, which is removed the next day; after this, injections into the vagina are given every morning and evening, by means of smooth, well-greased metal cannulæ, whose size is increased from day to day without the patient's knowledge. The author reports having treated by this method 3 cases of severe vaginismus in recently married women; in none of these had coitus been possible, but all were completely cured, and in two, pregnancy soon occurred. He thinks the great advantage of his method of treatment lies in the fact, that by it all the muscles of the pelvic floor, especially the levator ani, are thoroughly stretched.

The Use of Pituitrin as a Styptic in Gynecology. While a very considerable amount of literature has appeared recently concerning the use of an extract of the hypophysis, commonly known as pituitrin, as an oxytocic and hemostatic in obstetric work, not much has been said about its application to gynecologic conditions. Bab,¹ however, reports having seen marked results produced by it in cases of hemorrhage from a metritis or endometritis, and in menorrhagias due to inflammation of the adnexa; in many instances, cessation of the bleeding occurred following its use, after hydrastis, ergot, stypticin, and other drugs had been tried in vain. In two-thirds of about 30 such cases treated with pituitrin, the bleeding stopped on the first or second day, and in only 6 per cent. was no effect at all produced. Many of these cases were unusually severe, the patients having been bleeding for several weeks before admission, and the hemorrhage having kept up during the several days that they were always kept under observation

¹ Münch. med. Woch., 1911, lviii, 1554.

before instituting the treatment, to be sure that any effect produced was really due to this and not to the mere rest and care of the hospital. The dose given was usually 2 to 3 c.c. of pituitrin, injected subcutaneously; this was repeated on several successive days, if necessary. The only unpleasant effects complained of by the patients were occasional labor-like uterine pains, but these were never very severe.

Electrical Treatment of Gynecologic Conditions. Petit¹ says that while various forms of the electric current are of value in gynecologic therapeutics, their most important use is in the control of hemorrhage, either acute or chronic. A sudden, alarming hemorrhage may be effectively controlled by the use of the rapidly interrupted, tetanizing faradic current, which is a rapid and sure hemostatic, suitable for use in emergencies. The constant current should, however, be used for the permanent cure of hemorrhage. For this purpose it is applied to the interior of the uterus, where it exerts a caustic action, similar to that of the thermocautery, causing coagulation of the blood and destruction of the mucous membrane, its hemostatic effect being further enhanced by a decided excitomotor action which it has on the muscular fibers of the uterus. If an intrauterine positive pole of silver, copper, or zinc be used, ions of these metals are driven off into the mucosa, where they exert a coagulating and hemostatic effect. This method of controlling hemorrhage is of especial value in treating metrorrhagias in virgins, where curetting is only of temporary benefit, though practically all forms of bleeding are amenable to electric treatment. The author believes, however, that where the hemorrhage is dependent upon the presence of fibroids, the use of the *x*-ray is preferable.

Secondary but still important uses for the electric current in gynecology are found in the treatment of leucorrhea and of genital hypoplasia, its effect in the former condition being dependent upon its bactericidal and disinfectant properties. In cases of amenorrhea due to infantile uterus, electric treatment often works wonders, causing enlargement of the uterus and the appearance of menstruation. Atresia of the cervix, which is often found associated with this condition, may be easily overcome by utilizing the dilating properties of the negative pole, it frequently being found that a metal electrode will penetrate after all other attempts at dilatation have proved futile.

Röntgen Therapy in Gynecology. Under the caption "Questions of the Day," Döderlein² reviews the present status of the Röntgen-ray treatment of gynecologic affections. The first to show the destructive effect of these rays on the parenchyma of the sexual glands was Albers-Schönberg, who demonstrated experimentally, in 1903, that male animals lose their fertilizing power, although retaining sexual instinct and ability to perform coitus, after long exposure to the rays, an obser-

¹ Rev. prat. d'obst., de gyn., et de péd., 1911, No. 7, 193.

² Monatschr. f. Geb. u. Gyn., 1911, xxxiii, 413.

vation which was subsequently found to be equally true of those working with insufficiently protected *x*-ray tubes.

A similar destructive action is exerted on the female sexual gland, but here this effect may be employed for beneficial purposes, especially in the way of indirectly influencing the uterus, this being possible on account of the intimate physiologic connection between the two organs. It is important, however, to realize that the technique of Röntgen therapy forms a special science, whose intricacies must be thoroughly mastered by him who would apply it without exposing himself and his patients to grave consequences. Applied in the proper way, radiotherapy has become a keen competitor of many operative procedures, having the great advantage of absolute safety, so far as life is concerned.

With regard to the effect actually produced by the rays on the ovaries, and the results of their application therapeutically, Döderlein, in addition to giving his own experience, quotes quite freely from that of others, especially Reifferscheid.¹ The latter investigator has found, histologically, extensive evidences of destruction of ova and follicle-epithelium in both human and animal ovaries after exposure to *x*-rays.

The most important indication for *x*-ray therapy in gynecology is in the treatment of myomata, and yet its use must be limited here to suitable cases. Those in which the ovaries are hidden away behind large tumors, and therefore difficult of access for the rays; the many cases in which the bleeding is not directly due to ovarian activity, but to gross lesions already produced by the tumor; the whole group of polypoid, gangrenous, and markedly degenerated growths; and last, but not least, myomata in which a combination with malignancy exists—all these are to be treated by surgical means, as only lamentable failure will be the result of trying to extend the indications for radiotherapy to include these forms. The author considers very severe hemorrhage, a hemoglobin percentage below 40, apparent inability of the patient to withstand a certain amount of shock, and the slightest suspicion of malignancy to be absolute contraindications to this form of treatment. After eliminating all unsuitable cases, however, there is left a wide field of usefulness for Röntgen therapy in the treatment of myomata.

A second field in which Döderlein has found the *x*-ray to be of the greatest value is in the treatment of those inexplicable climacteric bleedings, without demonstrable lesions, whose cause is still an unsolved problem. By means of the *x*-ray they may be completely controlled, and this, in an elective manner, so that the internal secretion of the ovaries is not entirely destroyed, a fact of no slight importance, even in women near the climacterium.

¹ Zwanglose Abhandlungen aus dem Gebiete der medizinischen Elektrologie und Röntgenkunde, Leipzig, 1911.

In the treatment of dysmenorrhea in young women the author has also had very favorable results, though he is unable to give an explanation for this other than that it may be due wholly to a psychic effect, or to some beneficial action produced on painful ovaries by temporary impairment of the parenchyma.

A further field of usefulness for Röntgen therapy has been found in the treatment of pruritus vulvæ, a few stubborn cases having yielded to this after all other forms of therapeusis had failed. In osteomalacia, tuberculous peritonitis, and cancer of the female organs of reproduction, on the other hand, results have been negative.

Experimentally, it has been found that x -rays exert very deleterious effects upon the products of conception, and may even cause fetal death; with regard to their efficacy in producing abortion, *e. g.*, in tuberculous cases, experiences differ. Döderlein himself has seen a prompt result in one case, and believes that here is a distinct indication, in suitable instances, for the use of the rays. If the desired result is not produced, other means must, of course, be resorted to.

In conclusion, the author says that the Röntgen ray has assured itself a definite place in gynecology, having filled in a most admirable manner what was heretofore a decided break in our therapeutic resources.

THE OVARY

Carcinoma of the Ovary in Young Girls. An interesting case of this condition occurring in a girl, aged eleven years, has been reported by Lahey and Haythorn.¹ Four months previous to the operation for the ovarian condition, the patient's appendix had been removed, at which time, apparently, no abnormalities were noted in the pelvic organs. Following this, the child showed much wasting and cachexia, vomiting, and enlargement of the abdomen, which was tensely distended by fluid. At operation, both ovaries were found to be three times the normal size, and very nodular. Other nodular masses were found all over the abdomen and filling the pelvis. In this case, the diagnosis from tuberculous peritonitis was very difficult, especially as after the appendix operation the patient had developed a swelling of the right knee, which disappeared after rest, and showed the typical signs of a tuberculous process. At autopsy, a general metastatic condition was found in almost all organs of the body, with double hydrothorax, hydropericardium, and edema of the left leg. The authors consider the differential diagnosis between various malignant tumors of the ovary in young girls rarely possible, and that fluid in the abdomen in children without general anasarca, where adhesive pericarditis and

¹ American Journal of the Medical Sciences, 1912, cxliii, 257.

cirrhosis of the liver can be excluded, should always be investigated by an exploratory laparotomy. They emphasize the fact that ovarian tumors, especially in young girls, should be removed with the least possible delay.

The Functions of the Corpus Luteum. Among the numerous functions which are being ascribed by modern investigators to the corpus luteum, is that of producing an internal secretion which governs the development of the mammary gland. Bouin and Ancel¹ call attention to the fact that the older theory of the relationship between the occurrence of functional activity in the mammary gland and some nervous reflex action has been disproved by experiments in which all nervous connections to the breast were severed and yet functional activity took place as before. Hence, the theory of some chemical reflex, of the action of some "hormone," has been advanced.

Believing that the seat of the production of this substance might lie in the corpus luteum, the authors have carried out a number of experiments on rabbits, choosing this animal because in it spontaneous ovulation does not occur, and the production of ovulation, and consequently of corpus luteum formation, can be controlled artificially. This may be done either by allowing coitus with male animals which have been rendered sterile by the ligation of the vas deferens, or by opening the abdomen and with the point of a knife rupturing ripe Graafian follicles. In this way corpora lutea can be produced at will without the occurrence of pregnancy, or of any other condition that might complicate the results.

It was found that following such a procedure an enormous anatomical development of the mammary gland takes place, the acini increasing greatly in number and volume, and the connective tissue between them decreasing proportionally. This development goes on until about the sixteenth day after the follicle rupture, by which time it has reached its height. From then on the acini begin to diminish in volume, their lumen becomes obliterated, the ramifications grow less, and the vascularity of the tissue diminishes, so that by the twenty-sixth day complete atrophy has occurred. After a normal coitus, on the other hand, which is followed by pregnancy, this atrophy after the twenty-sixth day does not occur, the gland continuing to increase in size; this further increase is not due, however, to continued multiplication of the cells of the gland, but to a filling and engorgement of the lumina of the acini with secretory products.

In other words, the development of the mammary gland in the first half of pregnancy is morphologic—due to an actual increase in its anatomic elements; that in the second half is physiologic—due to the taking on of secretory activity. These two processes appear to

¹ Presse Méd., 1911, No. 55.

be under entirely separate and distinct control, the corpus luteum being concerned only with the first, and not at all with the second. It occasionally happens that coitus fails to produce the rupture of a Graafian follicle; in this case, of course, no corpus luteum is formed, and no development of mammary tissue follows. If corpora lutea have been formed after coitus, as is usually the case, but are then destroyed by means of a fine-pointed thermocautery, no mammary development occurs. If a few days are allowed to elapse between the formation of the corpora lutea and their destruction in this manner, the already developing gland at once ceases all further development, and undergoes atrophy.

The authors believe that these facts demonstrate conclusively that the hormone causing the morphologic development of the breast in pregnancy arises in the corpus luteum. This theory explains the well-known fact that in woman, in whom spontaneous ovulation occurs, there is a decided increase in the size of the breast at puberty, and thereafter, at each menstrual period, this being due to the short-lived corpus luteum of menstruation which is formed at those times. As the corpus luteum soon degenerates, if pregnancy does not occur, the breast tissue does not undergo any very extensive amount of development.

The authors believe that the second hormone—that causing the fully developed mammary gland to begin secreting—has its origin in a gland of internal secretion which they have discovered in the myometrium of the pregnant rabbit, and to which they have given the name of “myometrial gland.”

Various other functions of the corpus luteum have been investigated by Loeb.¹ In addition to producing a hormone, which, as has been shown by him in previous investigations, sensitizes the endometrium so that it responds by the formation of a decidua to any form of irritation, this interesting structure has an important function in hindering ovulation, thereby prolonging the sexual cycle. By examining a large number of guinea-pigs, Loeb found that no ovulation occurred within less than fifteen days of a preceding one; in the large majority of cases, not in less than nineteen days. If, however, the ovaries are exposed and all corpora lutea excised six to seven and one-half days following coitus (which is always followed within ten days by ovulation), ovulation usually occurs within twelve to sixteen days, providing the extirpation of the corpora lutea has been *complete*. If bits of corpus luteum tissue have been left behind, no premature ovulation occurs. Ordinarily, there is no ovulation during pregnancy, but removal of the corpora lutea at this time has the same effect in producing a new ovulation, as it is the presence of the corpus luteum and not the pregnancy *per se* that prevents it.

¹ Deutsch. med. Woch., 1911, xxxvii, 17.

Ovarian Transplantation. Martin,¹ after reviewing the literature of ovarian transplantation, comes to the following conclusion:

Autotransplantation of the ovaries, or a portion of the ovaries, as a practicable operation which can be performed successfully and expeditiously with a simple technique, by any surgeon of ordinary ability and training, is now well demonstrated by the work of many observers, as shown in the literature.

Transplantation of the ovaries, or a portion of the ovaries, is successfully accomplished by attaching or imbedding the cut surface of the graft onto or into a well-nourished tissue (the horn of the uterus, the broad ligament, the parietal peritoneum, or the muscles of the abdominal wall or the subcutaneous tissue anywhere) without the necessity of bloodvessel anastomosis.

It seems to be established that a small portion of ovary successfully engrafted anywhere, furnishes to the subject of the graft the secretion or influence which preserves her sexuality, and prevents atrophy of the genital organs and other changes in the individual that are coincident with complete castration.

The same technique in heterotransplantation of ovaries, even in individuals of the same species, does not give such uniformly successful results as does homotransplantation, owing to a peculiar heterogeneity that our experiments have demonstrated, but the character of which we do not know, except that individuals of close consanguinity appear to be less antagonistic to grafts one to the other.

Martin's work, and the work of Mauclore, Marshall, Jolly, Sauv  , and Casalis, and others on human females, and the work of Pankow and Sauv   on animals, clearly demonstrate that there is a definite antagonism between the blood or the tissues of one individual and that of another to an ovarian graft.

The work of Pankow and Sauv   seems to show that this lack of homogeneity of conditions exists less between animals closely related by consanguinity. On the other hand, Martin's experience, and the reported work of Casalis, Sauv  , Marshall, and Jolly, Mauclore, Pankow, and others, demonstrate that there is practically no antagonism between the blood or tissues of an individual to ovarian grafts from her own ovaries.

As the lack of success in transplanting ovaries from one individual of the same species to another is not due to technique apparently, but to tissue or blood antagonism, will it be possible, asks the author, by some process of preparation of patients, to render the blood or the tissues of the donor and recipient homogeneous and thus make more successful tissue transplantation?

¹ Transactions of the American Gynecological Society, xxxvi, 337.

THE BLADDER AND URETERS

Stiles¹ describes a method for the *treatment of epispadias in the female*. He reminds us that the cases vary in severity, and that the lesion may consist of: Partial epispadias, where the deeper part of the dorsal wall of the urethra is developed; complete epispadias, where the dorsal wall is entirely absent; and subsymphyseal extroversion, where the sphincter at the neck of the bladder is deficient and there is more or less protrusion below the symphysis of the mucous membrane of the posterior wall of the bladder.

The differentiation between complete epispadias and a slight degree of subsymphyseal extroversion is sometimes impossible, but practically, the two lesions may be classed together, as both give rise to incontinence and call for the same treatment.

The indications for treatment are twofold: First, to rid the patient of the incontinence, and second, to repair the cleft condition of the anterior part of the vulva. The incontinence is the symptom which drives the patient to the doctor.

The author reviews the efforts which have been made to cure the incontinence by various plastic operations, aimed to restore the clefts in the affected parts, and, although many of them have shown ingenuity, and many have succeeded from the cosmetic standpoint, the incontinence of urine still persists in the majority of cases, to a greater or a less degree. It is no doubt a fact, that a transplantation of the ureters into some part of the intestine, is, after all, the only certain way of overcoming the incontinence of urine in many of the cases.

The great objections to transplantation of the ureter into the intestine are immediately peritonitis and subsequently ascending infection of the kidney. In order to prevent ascending infection it is quite customary, at the present time, to transplant the ureters together with a portion of the bladder wall surrounding the ureteric orifices. This is quite readily done in cases of extroversion, but in epispadias without extroversion, in order to transplant the ureters along with their orifices, the first step in the operation would entail gaining access to them either by opening the bladder suprapubically or by an extensive perineal dissection, either of which procedures would greatly complicate the operation as well as render it a formidable one.

Stiles, therefore, believes that the best course to adopt in epispadias without extroversion is to expose and divide the ureters as close to the bladder as possible, by the intraperitoneal route, and then to transplant them separately into the lower part of the pelvic colon. He describes his operation as follows:

¹ Surgery, Gynecology, and Obstetrics, 1911, xiii, 127.

After making a median abdominal incision below the umbilicus, and exposing the pelvis, the ureter was located and then the peritoneum was picked up on either side of the ureter at the level of the brim of the pelvis, a little below the termination of the common iliac artery. By making traction upon the forceps, a fold of peritoneum, running at right angles to the ureter, was pulled forward with it into the wound.

A small incision was then made at right angles to the peritoneal fold along the line of the ureter, care being taken to avoid injury to the small ureteric vessels which were distinctly seen upon the surface of the ureter through the peritoneum. The small opening in the peritoneum was then enlarged with scissors upward and downward along the line of the ureter.

By means of blunt dissection the ureter along with its vessels was now freed from the extraperitoneal cellular tissue upward as far as the brim of the pelvis, and downward as far as the base of the broad ligament. In doing this, care was taken not to injure the ovarian vessels which run a little above and external to it.

By means of an aneurysm needle threaded with catgut, the ureter was ligatured below the base of the broad ligament a short distance above the ligature, and, after applying sublimated iodoform to the stump, it was allowed to drop back into the pelvic cellular tissue. Before dividing the ureter, however, a light pair of spring forceps was applied to the upper end of the free portion so as to prevent escape of urine during the next step of the operation, namely, the implantation of the divided end into the lowest part of the pelvic colon.

Preparatory to this step, what may be termed a guiding and fixation catgut suture was introduced into the ureter in the following manner: A fine curved needle was threaded on to each end of the suture and made to transfix the whole thickness of the wall of the ureter from within outward, about one-fourth of an inch above its divided end, the two needles being made to emerge at a distance from each other equal to about one-third of the circumference of the ureter. In this way a loop was left inside the lumen, the two ends having the needle still attached. The freed portion of the ureter, along with the catgut and needles, was then folded over the upper edge of the wound and covered with a swab.

Having removed all the swabs, the lowest part of the pelvic colon was now pulled up into the wound and a loop, about three inches in length, was clamped off with a light pair of intestinal clamp forceps. In the young child, the longitudinal muscular fibers of this portion of the colon, instead of being collected into three bands, form a continuous layer around the whole circumference. After again shutting off the peritoneal cavity by placing a fresh set of gauze packs around the loop, a transverse incision, about one-fourth inch in length, was made, down to, but not through the mucous membrane on the antimesenteric

aspect at the junction of the middle and lower thirds of the clamped-off portion.

By snipping off the apex of a tiny diverticulum of mucous membrane, pulled forward by fine conjunctival fixation forceps, a small opening was made into the bowel. The end of the ureter was drawn through the opening and fixed within the lumen of the bowel by means of the fixation suture. This was done by passing each of the needles into the opening so that they transfix the wall of the intestine from within outward about one-fourth of an inch below the opening, and at the same distance from each other.

By drawing on the suture, the end of the ureter is pulled toward the small opening in the bowel and gently coaxed through it by means of a probe. After satisfying oneself that the whole circumference of the end of the ureter is well within the bowel, the loop is drawn taut and the two ends knotted on the outer surface of the intestine. Catgut, rather than silk, should be used for this guiding suture, as it is only intended to serve the purpose of drawing the ureter into the bowel so as to fix it temporarily within the lumen while the more permanent fixation sutures are being introduced. The objection to silk is that it would lead to the deposit of phosphates.

The permanent fixation suture is applied on the Witzel-gastrostomy principle. Two parallel folds of the intestinal wall are united over the implanted ureter by means of a straight needle and continuous suture of fine linen thread. The folding-over process should be commenced three-fourths of an inch below the entrance of the ureter into the bowel, and should be continued for an inch above it. During the introduction of this latter portion of the suture, the needle, after picking up a seromuscular fold on the one side of the ureter, should, before it traverses the fold on the other side, pick up a portion of the wall of the ureter without, however, entering its lumen.

In the older children, the diameter of the pelvic colon may be considerably larger and to provide an additional safeguard against leakage two rows of sutures may be applied, the first in the same way as above described, except that they should be interrupted instead of continuous. Outside these, a still finer continuous suture must be employed, but without, of course, including the ureter. It is very questionable, however, if this row is really necessary.

After removing the gauze packs and introducing a fresh set to pack away the ovary and intestines, the divided peritoneum upon the floor and posterior wall of the pelvis was united from below upward, by means of a continuous catgut suture, a small opening being left at the uppermost part for the passage of the ureter. In doing this, care should be taken not to include the ovarian vessels which lie only a little external to the outer peritoneal edge. In order to diminish the risk of subsequent strangulation, either of the bowel or the ureter,

it is important to see that the portion of ureter which passes from the opening left in the peritoneum to the site of implantation, should be as short as possible, and it is with this object in view that the implantation in the pelvic colon is made as near the rectum as possible.

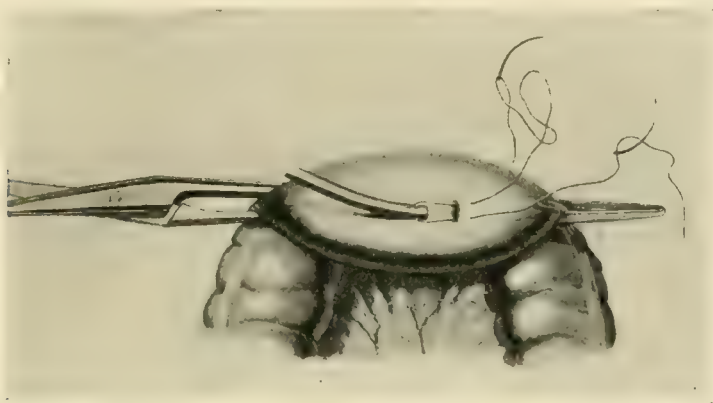


FIG. 50

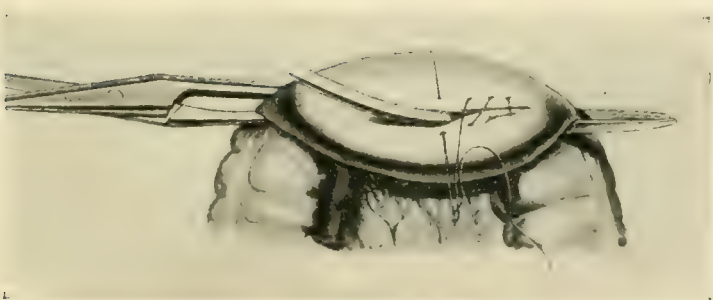


FIG. 51

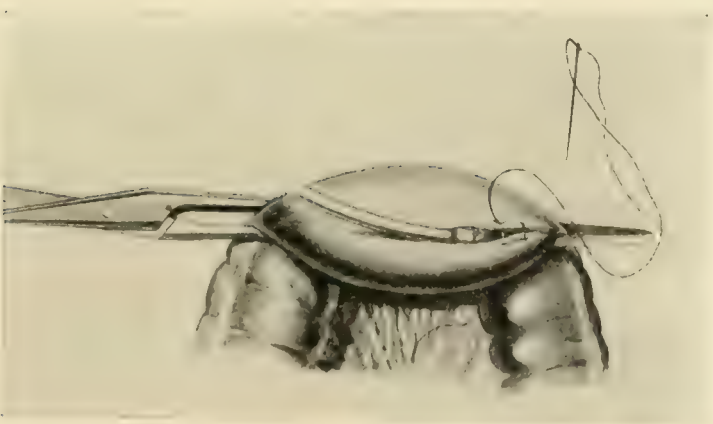


FIG. 52

The second operation for transplanting a left ureter should be performed some three weeks after the first. The author has carried out this plan in two patients, and more than three years has elapsed in each one, without either of them showing any evidences of an ascending infection. Both the patients are comfortable, and the operations are regarded as very successful. The author believes that in these cases

it is undoubtedly safer to transplant one ureter at a time, because if one of the kidneys becomes infected, either temporarily or permanently, the other one will be able to carry on the renal functions.

The author expressed the hope that the adoption of this simple method of uretero-intestinal anastomosis as a preliminary step in the operative treatment of malignant disease of the bladder offers the hope of dealing with cases radically, which, up to this time, have appeared hopeless.

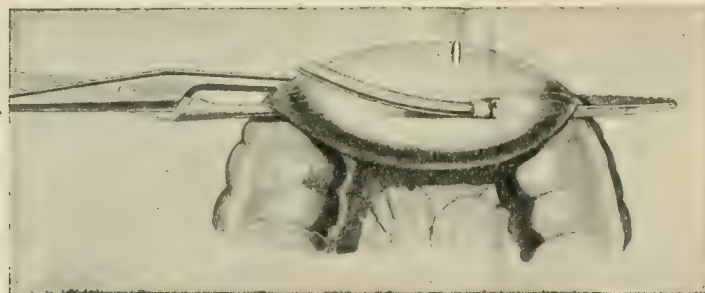


FIG. 53

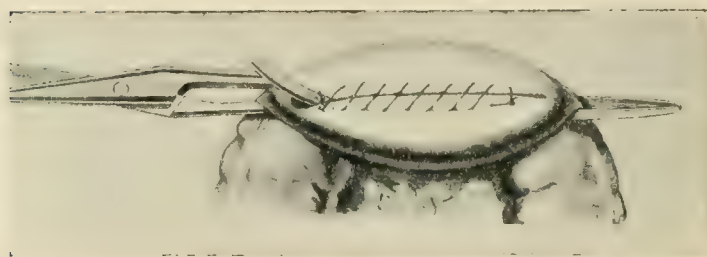


FIG. 54

Treatment of Ureters Injured during Gynecologic Operations. Stoeckel¹ says that one result of the advanced radicalism in the treatment of carcinoma of the uterus, and of the constantly increasing number of inexperienced operators who attempt these difficult operations, is an ever greater number of injuries to the ureters in the course of gynecologic operations. He affirms most positively that it is always the fault of the operator if a ureter is injured in any case except one of malignancy, it matters not how the operation is performed, whether by the vaginal or the abdominal route; whether the ureter follows its normal course, or is greatly displaced by a large myoma or other tumor, injury to it is avoidable in all non-malignant cases by the use of proper skill and caution. Where the ureter is surrounded by carcinomatous tissue, however, it is quite another matter; here it may be necessary to isolate it for a considerable distance from the surrounding tissue, to cut through it, or even to resect a portion of it.

While a failure to discover that the ureter has been injured during the course of a vaginal operation may at times be excusable, such an

¹Zeit. f. gyn. Urologie, 1911, iii, 51.

oversight must be considered the worst sort of a technical error in a laparotomy. The author has found that the ureter may be isolated from the surrounding tissue for a distance of at least 10 cm. without harm, and that while such a ureter may later become compressed and narrowed by contracting scar tissue around it, it will never become obliterated, or even dangerously stenosed, except by a recurrence of the malignant growth. He believes, however, that a ureter which has been dug out of a carcinomatous bed always presents the possibility of becoming the seat of a recurrence, this happening probably much more frequently than most authors would have us believe; moreover, if the walls of the ureter have been injured it may become secondarily infected, this leading to a pyelonephritis, or to secondary fistula formation.

He recommends resection, therefore, in bad cases, but resection of *one* ureter only, as bilateral implantation into the bladder is very unsatisfactory. He believes that while many ureteral fistulæ heal spontaneously, this is often accompanied by complete or partial occlusion of the ureter, with a corresponding total elimination or partial reduction in the function of the kidney. Since long waiting for a fistula to heal also favors the occurrence of an ascending infection, he considers that the principle of waiting for months should be given up in favor of operating within a few weeks at most, and that in operating the vaginal plastic method should be entirely abandoned for the intraperitoneal implantation into the bladder. He says it is of great importance, in doing this to cut a little circular piece of tissue out of the bladder wall instead of merely making a slit in it, because the latter is very apt to undergo contraction, with consequent constriction of the ureteral opening.

In order still further to prevent this misfortune, he stitches the bladder mucosa to the serosa around the entire edge of the opening, so as to prevent the formation of a granulating wound. The hole then remains permanent in its original size, and the procedure does not, in any way, affect its healing to the ureter. The cut end of the ureter is then passed well in through the opening, so that it projects somewhat into the bladder, and is attached to the vesical wall by fine interrupted sutures of absorbable material, the bladder wall being drawn well over to the affected side, and folded back along the ureter for some distance, so that the latter lies in a sort of tunnel formed by the bladder.

Stoeckel does not consider it good policy to attempt to close directly by suture an opening into the ureter if it involves more than one-third of the circumference, as this usually leads to stenosis; unless the point of injury is too far from the bladder, it is better, in these cases, to cut through the ureter, and re-implant it into the bladder. When pyelitis or pyelonephritis is present, temporizing is useless, and a nephrectomy should be done at once. The author does not believe in implantation of the ureters into the intestine or the skin under any circumstances,

as such procedures always lead, sooner or later, to infection of the kidney, which must then be removed. He suggests that a simple and often very useful method of treatment, in cases in which, owing to the great length of the resected portion, implantation of the ureter into the bladder is impossible, consists in the ligation of the free end of the ureter, with consequent elimination of the corresponding kidney, such cases of sudden obstruction of the ureter usually resulting in a fibrosis and atrophy of that organ, and not in the production of a hydro-nephrosis. To accomplish this result satisfactorily, the ureter should be kinked on itself once or twice, as a simple ligation is very likely to give way.

Relaxation of the Sacro-iliac Joint. Meisenbach¹ emphasizes the importance which a relaxed condition of the sacro-iliac joint may assume in producing symptoms almost exactly simulating those of certain affections of the female reproductive system. Many of the old ideas as to the nature of this articulation have been disproved by Albee, who has shown by injection with methylene blue that the sacro-iliac is a true joint, possessing a hyaline articular cartilage, a synovial membrane, a capsule, and ligaments, and that it normally permits of a certain degree of motion. The author believes that when the pelvic ligaments are in their normal condition, the sacro-iliac joints can stand a considerable strain, but that when the ligaments become relaxed the joints easily yield. This may be brought about by a number of conditions, among the most important of which is passive congestion, occurring physiologically during pregnancy or menstruation, or pathologically associated with chronic uterine or adnexal inflammations. The symptoms produced may vary from a mild but constant ache in the back to very severe lancinating pains.

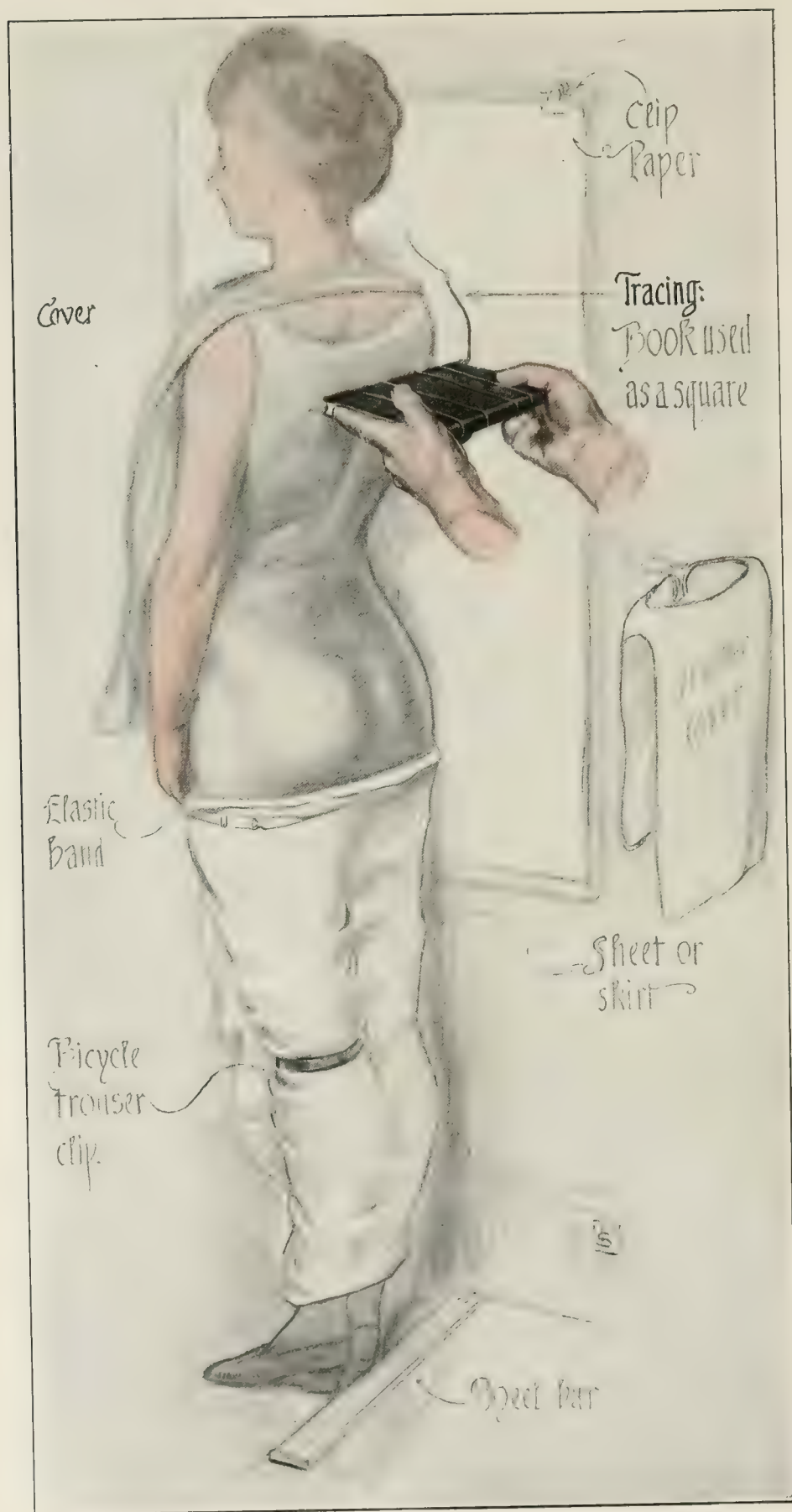
Meisenbach divides cases of sacro-iliac relaxation into four general types:

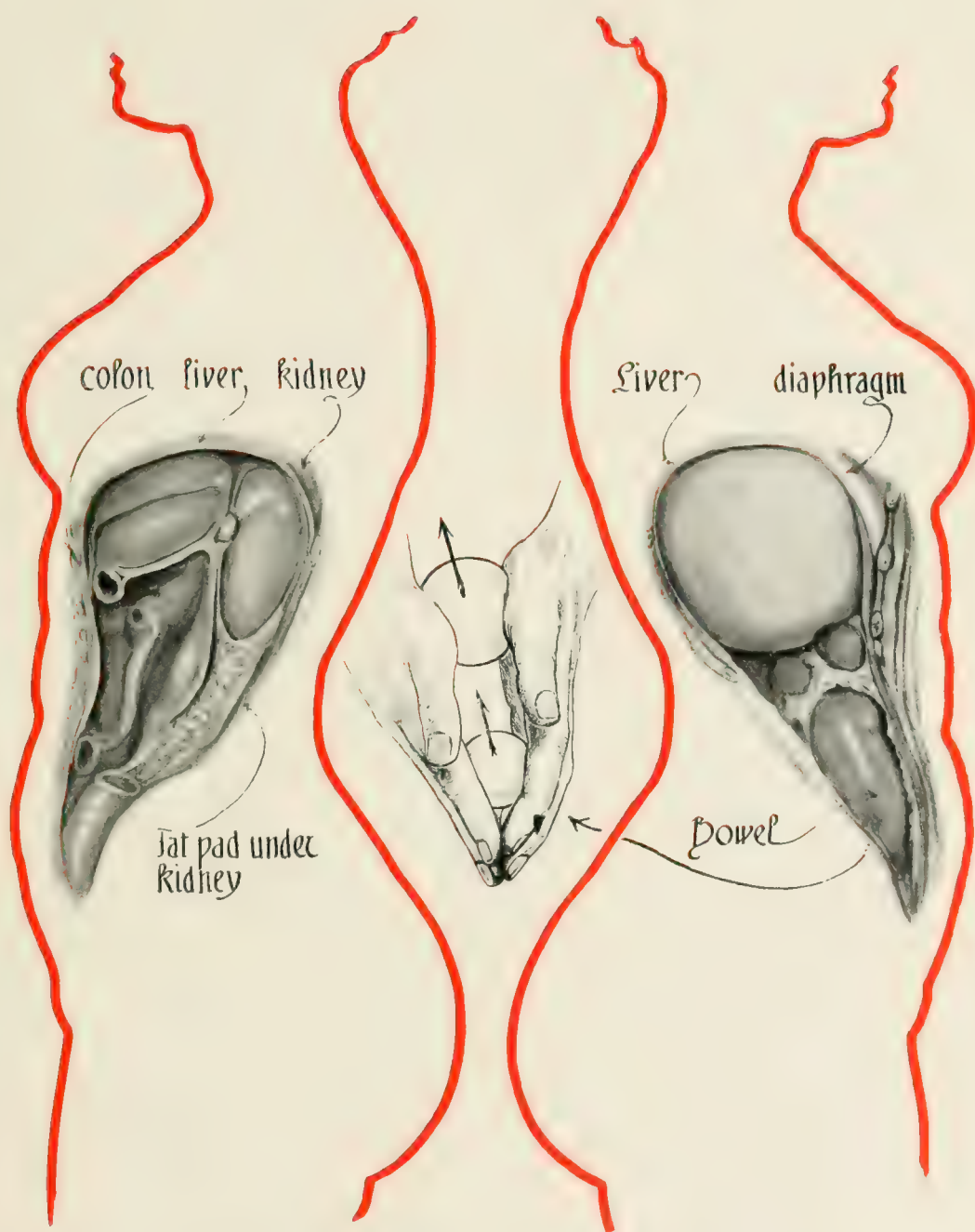
1. Traumatic. This may be produced by a sudden jump or fall, causing a strain or an actual displacement of the joint. It may also follow the relaxation of anesthesia, or occur as the result of long riding in trains or automobiles, and it is especially likely to be seen in patients with arthritic conditions.

2. Due to general debility. A marked bilateral weakening of the sacro-iliac joints is frequently observed during, or after, severe debilitating illnesses, such as typhoid fever.

3. Uterine. In many cases of pelvic congestion a relaxation of the sacro-iliac joints occurs, as has been said, producing symptoms which are referred to some gynecologic condition, but which are not in the least affected by the apparently indicated gynecologic treatment or operation. On going into the history of these patients it is frequently

¹ Surgery, Gynecology, and Obstetrics, 1911, xii, 411.





Normal Wedge Shape of Abdominal Cavity. Strong front muscles hold organs or lift them up posterior slant.

found that the trouble dates from about the time of a childbirth, and especially often from a labor in which high forceps were used. These cases, if treated only gynecologically, usually drift on into chronic invalidism, from which, however, they may be rescued, if the true condition is recognized and the proper treatment applied.

4. **Neurotic.** This form occurs occasionally in nervous, high-strung individuals, who lead an exceedingly active life, rarely relaxing except when asleep. This intermittent relaxation appears at times to cause a strain of the sacro-iliac joint.

With regard to diagnosis, the author believes that while the ordinary *x*-ray picture is of little or no value, the stereoscopic radiograph may be of the greatest service. The treatment is orthopedic—the application of a plaster or celluloid jacket, steel braces, elastic webbing, etc., according to the special indications of the individual case.

Ideal Corseting. Dickinson¹ says that one of three attitudes may be taken toward the corset: First, intolerance; second, surrender to inevitable fashion; third, opportunism that does the best it can, insistently remonstrant in harmful cases, wasting no time on neutral ones, and taking one's small part in the slow campaign of education, looking toward developed habits of exercise, appreciation of normal body forms, and true taste in dress.

In actual practice, he says, the matter goes largely by default. We give vague warnings or prohibitions that are temporary and futile. Merely to order a corset "loosened" when it may be of vicious design, is like telling a chronic colitic no more than to be careful of his diet. As the woman with a toppling uterus cannot go wrapper-clad, the gynecologist has to see that she is provided with some definite dress adjustment. Whether this turns out to be a help, or no more than a lessened hurt, it is manifestly our duty to select, direct, or control these means. Surgery is often the easiest portion of our service. A study of details and individual adaptation in these matters wherein our efforts are met with a smile, or a sneer, or a subterfuge, we naturally shirk.

Dickinson, impressed by the studies of Reynolds and Lovett, has carried out a series of observations in regard to the use of the corset, and the modifications of them, which may be made with advantage. He says that corsets may be classed as corrective, neutral, and harmful. From his observations he would not be led to conclude that low abdominal girdling and lifting had already taken the place of waist-line pressure in the customary corset of the day.

He tested the pressure of corsets upon the lower abdomen, at the waist-line, and on the lower ribs, by means of a mercury manometer, and he found that in two-thirds there was greater pressure at the waist

¹ American Journal of Obstetrics, lxiii, p. 1023.

than below. In one-third the pressure was equal. He found that the spring, or the gap of a corset, when unhooked, was an excellent practical measure of the amount of pressure which it exerted, two and one-half inches being the most that should be tolerated.

Dickinson also made some interesting observations in regard to posture, finding that in about one-half the cases the posture was defective, and that an alteration of the corset often markedly improved the attitude. He found a simple test which consists in standing a patient with her heels against a mark on the floor and her side to the wall, and noting the location of the scapula and the buttocks, with and without the corset, and any change for the better or worse, in the centre of gravity, and in uprightness.

The author has found much improvement from the use of regular exercise. Although the normal posture may call for a perpendicular line from the back of the buttocks to the back of the shoulder, with the shoulders not more than an inch in front of the buttocks, a few women are found whose scapular line is three inches anterior to the curve of the nates, and who show neither ache nor rigidity of the back muscles, nor of the gastrocnemius.

The things to be desired in the corset are, that it shall throw the shoulders backward and the buttocks forward, that it is snug around the hips and supports the lower abdomen, and that it causes no waist or upper abdominal constriction. A good corset can usually be found in a large, ready-made stock, needful alterations not being very expensive. The most frequent fault of the corset, namely, hour-glass constriction, may often be corrected by using a separate lace in the lower six holes, provided the corset sets low enough to grasp the hips and lower abdomen and by leaving the upper laces looser. This also makes usually for better posture, allowing wider separation above, and permitting the shoulders to drop backward.

It is undoubtedly true that a corset fitted in this way may be very uncomfortable if worn during hours of work or physical exercise. At such times skirts supported by shoulder-straps, or a loose non-figure producing corset, must be substituted. As a separate proposition, for afternoon or evening, our lady may stand and be admired, encased in conventional mould, or sit complacently erect, bending only when she must, and then from the hips forward.

This is one of the medical problems that calls for team work. Corsetiërs, women, and doctors must work together. Corset-makers and retailers should have more knowledge of anatomy and more respect for physiology. Their aim should not be wholly to make a corset that reduces the size of the waist. They should study to provide corsets adapted to different types of individuals that do not unduly compress and restrain, that neither fatigue nor grievously deform.

The practical application of this study is that, with a certain flexi-

bility in our ideas, without straight-lacing facts to fit a theory, without attempting to girdle within one general rule all the variety of conditions, and with the expectation of failures at first, the practitioner may secure a number of excellent results, particularly in cases of displacement and defective posture.

The problem is, at present, hygienically insoluble. In the long years it will care for itself. First, there will be developed in the race habits of vigorous exercise, which will make restraint impossibly irksome; second, cultivation of the grace and beauty of the normal form of the body will render voluntary deformity ridiculous or pitiable; and lastly, such a knowledge of true taste in dress and understanding of real loveliness of line will be inherited and instinctive that art will replace artifice.

Origin of Hydatid Mole. Falgowski¹ believes that strong evidence in favor of the view that the development of a hydatid mole is due to primary disease of the *ovum* is furnished by a case which he recently observed, in which a normal child and placenta were delivered simultaneously with a fully developed hydatid mole. It was evidently a case of twin pregnancy, in which two ova had been impregnated, one having developed normally, the other having undergone hydatid change; in this latter there was no trace of an embryo. Falgowski does not consider it conceivable in this instance that the development of the mole was due to endometritis or other uterine cause, as only one ovum was affected, and the only way that Marchand's theory of a multicystic degeneration of one ovary could be applied to it, would be to assume a superfetation of two ova, one from each ovary, at different times, a most highly improbable occurrence. That the development of hydatid mole is not due to death of the fetus, is shown by the fact that in many cases where the embryo dies, no mole is formed, and, on the other hand, cases have been known where only a small portion of the chorion was involved in the process and the fetus lived, so that it is impossible to say whether in these cases the death of the embryo is primary, or occurs as a result of the degeneration of the chorion.

Etiology of Prolapse in Virgins. The theory that the support of the uterus is entirely due to the pelvic floor (chiefly to the levator ani) has been advanced by Halban and Tandler² and others, but has been seriously attacked by Martin,³ who, as a result of recent investigations, attributes the more important rôle to thickenings of the pelvic connective tissue, and only a secondary one to the pelvic floor. That the latter view is correct is shown, according to Rosenthal,⁴ by the fact

¹ Monats. f. Geb. u. Gyn., 1911, xxxiv, 290.

² Anatomie und Aetiologie der Genitalprolapse beim Weibe, Wien and Leipzig, 1907.

³ Der Haftapparat der weiblichen Genitalien, Berlin, 1911.

⁴ Berl. klin. Woch., 1911, xlviii, 1127.

that most extensive forms of prolapse can occur with an intact pelvic floor. He reports 2 cases of prolapse in virgins, in each of which there was an associated condition of increased lumbar lordosis, unusual prominence of the sacral promontory, marked transposition backward of the genitals and rectum, and decidedly pendulous abdomen with enteroptosis. He believes that increased pelvic obliquity is an important etiologic factor in the production of vaginal prolapse, as it permits the intra-abdominal pressure to act much more forcibly than under normal conditions, owing to the more nearly perpendicular position of the vagina in the erect posture. It is certain, also, that abnormal positions of the pelvic viscera can be produced from this cause. The author believes, also, that a gonorrheal vulvovaginitis in childhood can cause, as a result of inflammation, injuries to the pelvic supports of the uterus, which may later permit a prolapse to occur.

Genital Crises in Tabes Dorsalis. Offergeld¹ says that while the so-called "gastric crises" of tabes are well known, the fact has been largely overlooked that similar attacks can involve almost all the organs of the body, this being especially true with regard to the female reproductive organs. The few cases reported in the literature presented, as a rule, either painful sensations in the external genitals, followed by lancinating pains in other organs, or another symptom-complex, consisting in spasm of the vagina and clitoris, with sexual excitation, followed by mucoid secretion from the vagina, all these phenomena having been observed as prodromal symptoms of a beginning ataxia. Occasionally, uterine crises are present in addition, in which case the pains resemble those of labor or miscarriage.

The author reports from personal observation the case of a patient, aged forty-eight years, in the second stage of tabes, who had probably acquired syphilis at the age of nineteen. She was referred to him for gynecologic examination and treatment on account of attacks of very severe colicky pain in the depths of the small pelvis from which she suffered at intervals. These came on suddenly, occurring about every two to three weeks; they lasted for several days, and then entirely disappeared until the next attack. They were felt during both day and night, and were entirely independent of menstruation, work, excitement, or other external conditions. They were bilateral, beginning in the pelvis, whence they extended down to the external genitals, causing a burning sensation at the vaginal outlet, and were then referred down the thighs, where they disappeared. There was no disturbance of the sexual sphere, and no increased secretion of mucus or other discharge from the vagina associated with the attacks.

Upon examination, Offergeld found the ovaries normal in size, and freely movable, but intensely painful to the slightest pressure from the

¹ Hegar's Beiträge z. Geb. u. Gyn., 1911, xvi, 373.

vagina; the uterus was retroflexed and movable. From the regularity with which the attacks occurred, the author came to the conclusion that they must be ovarian crises associated with the tabetic condition, an assumption which he says was justified by finding that the blood pressure was materially increased during the attacks, and that while the ovaries were extremely sensitive to palpation during an attack, they were not at all so in the interval. Local treatment has been of no avail whatsoever. The author did not consider any operation indicated, and as the patient is still alive, no direct examination of the ovaries has been possible, but he does not believe that they would show any demonstrable pathologic lesions. He emphasizes the importance of recognizing the condition, as otherwise unnecessary and even dangerous operations would surely be performed on many of these patients.

Relations between the Thyroid Gland and the Female Reproductive Organs. The attention of Goodall and Conn¹ was called to the close association between the thyroid and the ovaries by a rather remarkable case, which they relate in some detail. The patient, aged sixty years, had a thyroid gland the size of a cocoanut, suffered from marked nervousness, and presented the symptoms of chronic myocarditis secondary to disease of the mitral valve. She also had a hard, nodular mass, filling Douglas' pouch, pushing forward and solidly fixing the uterus. At operation, this mass was found to be inflammatory in nature, the result of chronic pelvic tuberculosis, both tubes being greatly distended with pus, and the ovaries riddled with small abscesses. About twelve days after the removal of the uterus and adnexa an appreciable diminution in the size of the thyroid was noticed, and by the thirtieth day after operation that organ had shrunk to normal dimensions; the process did not stop here, however, a still further reduction in size apparently taking place, so that the authors fear the occurrence of symptoms of athyrea, though no such trouble had occurred up to the time of writing, six months after the operation. In this instance, the thyroid enlargement came on after the pelvic trouble began, and removal of the inflammatory focus in the pelvis was followed by a spontaneous absorption of the excess thyroid, so that the authors believe the pelvic disease to have been undoubtedly the cause, and the thyroid enlargement the effect.

A further series of cases is quoted, in which myxedema, or other symptoms of hypothyroidism, were associated with a diminution or absence of the menstrual function. In some of these cases severe epileptic attacks, or other distressing menstrual molimina, occurred at the times when menstruation should have taken place; in them all, marked improvement followed treatment with thyroid extract, this being in some instances combined with calcium lactate.

¹ Surgery, Gynecology, and Obstetrics, 1911, xii, 457.

The authors have not been able to observe personally any cases illustrating the opposite condition, namely, the influence of *hyperthyroidism* on the sexual function, but quote from Pinard a series of cases in which marked menstrual disturbances, usually of the amenorrheic type, were associated with exophthalmic goitre. The fact that small doses of thyroid extract will often cause marked relief of symptoms following an artificial or natural menopause, supposed to be due to a loss of balance among the ductless glands, indicates that, conversely, primary disturbances in the sexual function may exert an influence on thyroid activity, which is also shown by the fact that an excessive secretory activity on the part of the ovaries seems to cause hypersecretion of the thyroid. In other words, these two glands are to be considered, not as *compensators*, but as *neutralizers* of each other. This idea is further borne out by the facts that an enlargement of the thyroid takes place at puberty, and, frequently, at the onset of pregnancy, and that while exophthalmic goitre almost always makes itself manifest during the years of greatest sexual activity, myxedema and cretinism generally occur either before or after the sexual period. It would, therefore, appear that the secretions of the ovary and the thyroid stand in a certain clinical antagonism to each other, and that either these two glands are under the same governing centre, or that they depress and stimulate each other into activity.

Repeated Ectopic Pregnancy. Smith¹ writes an interesting paper upon repeated ectopic pregnancy. The fact that ectopic pregnancy may repeat itself in the same patient is important, according to Smith's notion, since the whole future of our patient is likely to be influenced for good or for bad, by our decision when the abdomen has been opened, the offending tube disposed of, and we turn to the opposite side, in which lies her only chance for future childbearing.

In order to estimate the incidence of this accident, Smith has reviewed the literature and communicated directly with members of the American Gynecological Society. Discarding all reports except those based upon definite figures, Smith found 113 cases of recurrence in a total of 2998 cases, or a percentage slightly less than 3.8. He does not think, however, that this gives us a true estimate, and believes that the actual number of recurrences is higher.

As the result of his investigations, the author suggests that the matter of future possibilities be freely discussed as far as practicable with each patient before the abdomen is opened, and would suggest the following outline of procedure. If a woman has had no children and is young, or, being older, is desirous of having children, we should conserve the opposite tube, unless it is hopelessly closed. We do this deliberately, with the full knowledge that further pregnancies may not occur, and

¹ American Journal of Obstetrics, September, 1911, p. 401.

that she may have, in spite of the normal appearance of the tube, another ectopic pregnancy.

In women who have borne children we may be governed by her desire to have more, and may leave it, unless it is absolutely closed. In women who have had children, and have borne as many as they desire, we should unhesitatingly remove the opposite tube and preclude the possibility of further accident, whether the tube appears normal or not. By following this course, we shall, at least, have a good excuse for submitting a woman to the distressing possibility of a second ectopic pregnancy.

Salpingostomy and Subsequent Pregnancy. Gellhorn¹ brings up the question of how often salpingostomy is followed by pregnancy. He desires to discuss the question often arising in the course of laparotomy when occluded tubes are encountered, as to the advisability of opening and preserving them for the possibility of future offspring. He gives an illustrating case in which an incision through an occluded fimbriated extremity, together with the fixation of the everted flaps to the serosa of the tubes by means of fine sutures, was followed by two pregnancies.

The author reviews the writings of Martin, Skutch, Kehrer, Prochownik, Polk, Turk, Morris, Bonifield, Rosenstein, Reynolds, Clark, West, Schridle, Boldt, and others upon this subject. Altogether, the results of salpingostomy have been poor, and Gellhorn asks why conception does not occur more frequently, and what can be done to increase a percentage of subsequent pregnancies.

Pregnancy is unlikely to follow the operation if the tubal disease has been primarily of gonorrheal origin, because, even though all active inflammatory processes have disappeared, the ciliated epithelium has been destroyed, and the neighboring or opposing folds of the mucous membrane may be coalesced. All this militates against normal transplantation of the ovum and the penetration of the spermatic particle. Any attempt, then, to restore by an operation the normal function of a tube occluded on account of gonorrhea, appears *a priori* destined to failure. The same is true with regard to tuberculosis of the tubes.

Streptococcus or staphylococcus infections of the tube have a less destructive effect upon the tubal mucosa, but in any case in which pus is present salpingostomy should be absolutely excluded on account of the danger of infection. So, too, a greatly distended hydrosalpinx, whose muscularis and mucosa have undergone irreparable changes, would equally contraindicate any conservative operation.

There remains, then, merely a minority of cases in which salpingostomy appears not only justifiable but even promising of satisfactory end results. Broadly speaking, these are cases in which the occlusion of the tube has been caused by factors from without, in contradistinction

¹ Transactions of American Gynecological Society, xxxvi, 186.

to the categories mentioned in which the occlusion was produced by agencies from within the tubes. In this connection we have to consider mainly two sources, *viz.*, ectopic pregnancy and appendicitis.

In the former, the irritation of the peritoneum may cause an occlusion of the other tube, either directly or by means of the inundation of blood which secondarily seals up the fimbriated ostium. There is, as a rule, no infection present, and the second tube may well retain or regain its normal function. In ruptured extrauterine pregnancy the precarious condition of the patient will often forbid any attention to the tube of the other side, and this is an additional incentive toward diagnosing these cases early and before rupture, so time may be taken to restore the function of the tube.

The Influence of the Automobile upon Obstetric and Gynecologic Conditions. Edgar¹ discusses the influence of the automobile upon obstetric and gynecologic conditions. He asks: "How does the motor-car differ in its influence from the ordinary horse-drawn vehicle?" Another fact, and possibly less important, is that the distance traversed at one sitting is almost invariably greater with the motor-car than with the horse-drawn vehicle. The third, and possibly the most important difference between the two types of conveyance, is the effect upon the nervous and circulatory system.

In regard to the first, he believes that even the springless prairie schooner, drawn by the lazy oxen at four miles an hour, is not to be compared as regards suddenness and frequency of jars to an automobile, doing its forty miles an hour over the average American country road of today. In regard to the second, he compares the shopping tour in a horse-drawn vehicle to that in the automobile, in the latter instance the saving of time, permitting several turns about the park, or a run into the suburbs, or a run from a suburban residence to the city of thirty or forty miles. In regard to the third, he speaks of the tense muscles, the constant apprehension of collision, the nervous excitement and tachycardia from which many people suffer when riding in a motor car.

Edgar believes that motoring favors constipation; that it aggravates hemorrhoids; that it exaggerates pelvic or abdominal congestion, or inflammation in general; that it predisposes to, and increases, posterior displacement of the uterus and subinvolution. Excessive motoring does not have as unfavorable an influence on pregnancy as is often stated. The author's belief is that automobiling is most likely to interrupt pregnancy about the middle third.

Certain women, however, appear to be especially susceptible to the abortifacient influence of the automobile. This is particularly true in women with relaxed uterine supports. The automobile often does

¹ American Journal of Obstetrics, lxiii, 995.

much damage in patients who have had a miscarriage during the early months of pregnancy, and who go motoring shortly afterward. They may feel too weak or indolent for physical exercise, and yet readily undertake a several-hour motor ride. This predisposes to large, sub-involuted uteri, persistent leucorrhea, possibly backward displacement, and often beginning procidentia.

The beneficial influence of the automobile is seen in the better appetite, exhilaration and mental diversion of the anemic young woman with a low percentage of hemoglobin, soft flabby muscles, and disinclined to physical exercise. The automobile also has been a blessing to many women of middle life who have passed through a tempestuous menopause, and have increased in weight, so that locomotion of any kind, is difficult, or those who are enfeebled by cardiac disease, rheumatism, or gout.

OPERATIVE TREATMENT

Bacteriological Findings during Gynecologic Operations. The results of systematic cultures taken both before and during operation in fifty laparotomies and fifty vaginal operations, are reported by Hofbauer.¹ Staphylococci were found almost constantly, their occurrence bearing some relation to the duration of the operation. They are to be considered as an air-infection, and show no hemolytic action. In addition to these, there occurred in vaginal operations endogenous organisms, whose presence had been previously demonstrated in the cervix and vagina. Hemolytic streptococci were found in cases of cervix carcinoma and decubital ulcer. A feverish convalescence was sometimes, but by no means constantly, associated with the presence of hemolytic organisms. Colon bacilli were found only in cases of complete and incomplete perineal tear.

Warming the Operating Table. Robb² speaks of the importance of warming the operating table during the cool seasons of the year, and has hit upon a rather simple plan, by means of electric lamps fitted to a frame beneath.

The lamps are held in an upright position by attachments to two hollow, movable metal tubes, which extend from the upper end for a distance of three feet nine inches toward the foot of the operating table. Nine lamps of 32-candle power are attached to each tube. At the upper end in each tube there is a switch, so arranged that two lamps can be turned on at a time, thus making it possible to control the amount of heat used. The cords containing electric wires are brought through the floor in the middle of the room, and are of sufficient length to allow the operating table to be moved backward or forward. The supports

¹ Monats. f. Geb. u. Gyn., 1911, xxxiii, 528.

² Transactions of the American Gynecological Society, 1911, p. 487.

holding the lamps can be removed from the table, and the attachment can be so arranged that it can be used wherever there are electric light fixtures (Figs. 55 and 56).



FIG. 55.—Showing lamps, with table in Trendelenburg position.

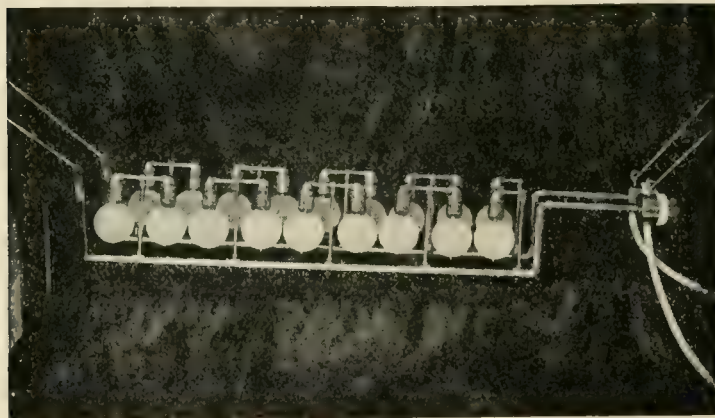


FIG. 56.—Showing lamps detached from operating table.

The patient can be cleaned up, or the abdominal cavity irrigated without injury to the lamps. The temperature under the table can be raised to 45° F. and on the upper surface of the table, protected with a thick towel, 17.1° F. in twenty minutes, thus rendering the air warm in the immediate vicinity of the patient. The glass plates on the operating table are covered in the middle portion with two coarse towels folded lengthwise, and the upper and lower portions of the table are covered with a piece of muslin folded double; or the pads usually employed may be applied to the table. For about twenty minutes or half an hour before the patient is placed on the table, the lamps are turned on.

When the patient is placed upon the table, the field of operation is cleansed, and dry pads are placed under her. As soon as the operation is begun, the lamps are turned out, but on a very cold day, or when the

patient is in a very weakened condition, the lamps are kept lighted throughout the operation. If the lamps are turned off at the beginning of the operation, they are again turned on for a few minutes while the concluding steps of the operation are being carried out. When this procedure is employed, the patient begins to react from the shock of the operation before she is removed from the operating room, and her resistance is probably materially increased in this way. Since Robb has been using this method of keeping the operating table warm, he has not met with a single case of bronchitis following an operation.

He has made a study of the temperature, before and after operation, in 138 cases. When the temperature of the operating room is under 83° F., there is always a more marked fall in the patient's temperature. For example, without the use of the lamps, in 38 abdominal sections with plastic operations, there was a total fall of 25.8° F. With the use of the lamps in 38 sections with plastic operations, with the room temperature at 79° F., there was a total fall of 10.6° F., less than half the fall that occurred when the lamps were not used, although the room temperature was 4° F. lower than in the series without the use of the lamps.

Similarly in the abdominal sections alone, the fall was twice as much without the use of the lamps, although the room temperature was from 3° to 4° higher than when the lamps were employed. Thus, it would seem from observations made up to the present time, that there is a distinct lowering of the patient's temperature where the lamps are not employed to keep the table warm.

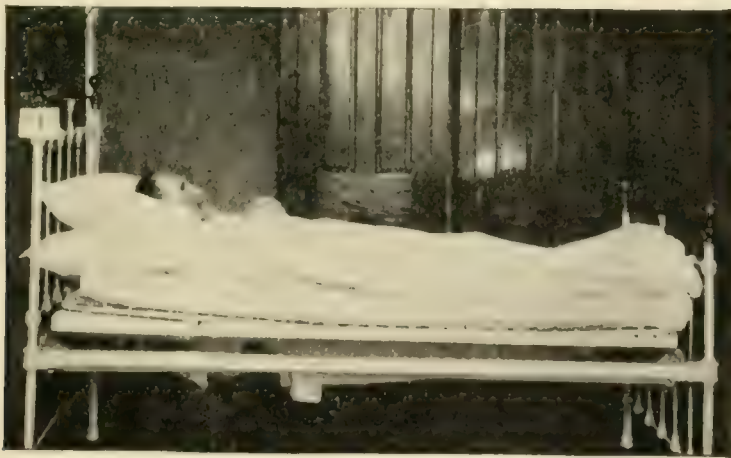


FIG. 57.—The Gatch frame is seen lying upon the ordinary spring mattress, the patient lying extended. (H. A. Kelly, in *Surgery, Gynecology, and Obstetrics*.)

Gatch Frame for Upright Position. Kelly¹ describes an iron frame which may be placed upon any hospital bed and permits easy elevation of the patient, and places him in a comfortable and easily kept position.

¹ *Surgery, Gynecology, and Obstetrics*, 1911, xiii, 78.

This frame, invented by Dr. Gatch, is valuable, also, in keeping patients in the Fowler position. (Figs. 57 and 58).



FIG. 58.—The Gatch frame elevated in both head and foot parts, giving the patient an easy reclining position. The elevation of the frame is effected by a notch on each side catching hold of the iron guard which serves also to keep the mattress in place, and pulling the head or the foot of the frame up until the cross-bar catches in the proper notch. The cards on the mattress near the head are used to indicate the days after operation, numbering 7 to 30. In this case, the patient is in his seventh day, as shown in Fig. 57. The card has been turned to indicate the second day, to call attention to the fact that it is my custom to get the patient up in this way either immediately or within twenty-four hours after the operation. (H. A. Kelly in *Surgery, Gynecology and Obstetrics*.)

Iodine Sterilization of the Skin. Bovée¹ has investigated the use of iodine in the sterilization of the skin for surgical purposes. The author points out the great convenience to patient and to surgeon, which rises from the substitution of the iodine for the older methods of preparing fields of operation. He also notes its advantage in the private house and in emergency procedures, where sterilization of the skin must be quickly accomplished. He furthermore draws attention to the fact that by this method, absolute sterilization of the skin may be attained.

He emphasizes the fact that the iodine should be applied to a dry skin, and not to one which has been moistened by other methods of preparation, because if the outer layer of the skin, which consists of dry epithelial scales, is swollen by moisture, the penetration of the iodine into the skin recesses is hampered. Bovée gives the following résumé of his experiments:

So far as can be ascertained by culturing epidermic scrapings, weak dilutions of iodine, even to 5 per cent. of the official tincture, thoroughly sterilize the surface of the skin after a period of time from two minutes to fifteen minutes from its application. These cultures, incubated three days, have not shown any colonies. Beyond that period of time, investi-

¹ Transactions of the American Gynecological Society, xxxvi, 111.

gations with this dilution of iodine in skin sterilization have not been made. While the inhibitive action of absolute alcohol is quite potent, this property is greatly enhanced by the addition of iodine to an equivalent of 5 per cent. of the U. S. P. tincture.

Pubic hair placed in iodine dilutions of 5, 10, 20, 30, and 40 per cent. strength (of the official tincture), respectively, all showed growths after three days' incubation, while using 50 per cent. dilutions under the same conditions practically always prevented growths.

Control scrapings of skin taken from the abdomen above the umbilicus over periods of time varying from two minutes to two hours when 40 per cent. dilutions were used, always showed negative results as to colonies.

Cultures from hair and skin that had been subjected to 50 per cent. dilution of tincture of iodine, never produced growths.

Tincture of iodine diluted with an equal amount of absolute alcohol may be considered reliable as a local application in preparation of the skin or mucosa in any part of the body. Dilutions of less strength are unreliable if hairs or large hair follicles are in the field of operation.

The 50 per cent. dilution of the tincture of iodine, if not carelessly applied, is not likely to injure the skin.

Persistent Dilatation of the Cervix with Intra-uterine Applications. Dudley¹ states that it is desirable, frequently to obtain slow and more or less persistent dilatation of the cervix, combined with the intra-uterine application of antiseptics. The sole purpose of his paper, he says, is to describe a simple means by which both may be obtained.

The device consists in the use of a tupelo sponge or sea-tangle tent, over the distal end of which has been attached half of a gelatin capsule filled with whatever medicinal substance may be desired for intra-uterine application. The diagram (Fig. 59) with its explanation, shows, first the sterile tent, over the end of which has been placed the gelatin half-capsule. The tent should be kept sterile in a test-tube stopped with cotton until used. The drawing shows also another tent slightly curved to facilitate introduction, and a half-capsule partly filled with a medicinal substance. Any form or size of tent may be used.

It is, perhaps, well to lay stress on the necessity of thorough disinfection of the tent and of keeping it aseptic until used. In Dudley's service at St. Luke's Hospital, the tents are exposed to a heat of 240° F. on two consecutive days, and again to the same degree of heat before using.

There is a possible defect in the iodine tent as above described, that is, in the gelatin capsule, which, although subject in the manufacture to considerable heat, is not aseptic, and may be a source of infection. The difficulty may be practically, and perhaps wholly obviated by

¹ Transactions of the American Gynecological Society, 1911, 499.

placing the half-capsule filled with iodine on the end of the tent two days before it is to be introduced; then the iodine permeates the capsule and renders it probably safe.

The only medicinal substance Dudley has used so far is a combination of iodine crystals, 1 part, and potassium iodide, 2 parts, this being a proportion which dissolves readily in water. Therefore, after introduction, the expanding tent stimulates uterine secretions, which dis-

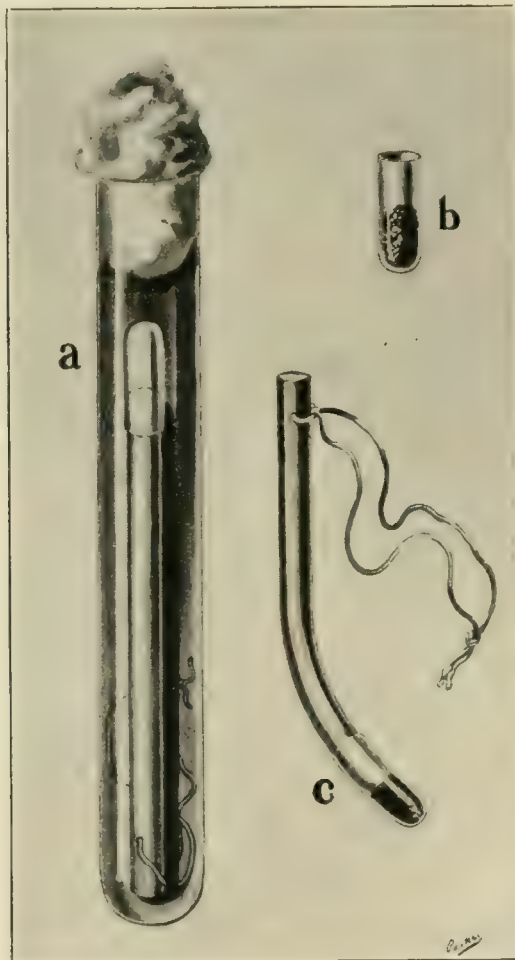


FIG. 59.—Device for prolonged dilatation of the uterus in conjunction with thorough intra-uterine medication: *a*, a tupelo tent with gelatin half-capsule attached kept sterile in a test-tube; *b*, a gelatin half-capsule, containing two parts of potassium iodide and one part of iodine crystals; *c*, a curved tent on the distal end of which has been placed the half-capsule containing iodine, one part, and potassium iodide, two parts, this mixture being soluble in water.

solve, first the capsule, and secondly, the iodine and potassium iodide, making at once a prolonged application to the endometrium; at the same time the iodine permeates the tent and renders it continuously antiseptic. Should the half-capsule not hold enough iodine, other capsules may be filled and placed each over the end of the preceding capsule, until a sufficient quantity has been secured.

This iodine combination dissolves readily in less than one-half its weight of water; therefore the uterine secretions, stimulated by the

tent, are quite sufficient to effect a solution. The solution, like Churchill's caustic solution, undoubtedly might have a very escharotic effect if too much of the iodine combination was used, and might, if applied, cause stenosis of the uterine ends of the Fallopian tubes.

It is also possible that if the tubes were open, uterine contractions might force it into the tubes with possible disastrous cauterization. Such an accident evidently would be more likely to occur in consequence of the cervical canal being tightly plugged by the tent. Dudley has not applied more than three or four grains of this combination, and would hesitate to increase the amount, except in case of a very flabby hemorrhagic uterus. Manifestly, it might be desirable to dilute the iodine combination in such a way as to insure the mucosa against destructive action. Such a dilution could be made with magnesium silicate, that is, talcum powder, this being comparatively an inert substance with which the iodine combined would have no chemical reaction.

Dudley advocates this method in cases of uterine catarrh, uterine hemorrhage, dysmenorrhea, and sterility. He emphasizes very strongly that such treatment should not be undertaken in the office, but should be surrounded by all the safeguards of a surgical operation in the patient's house or in a hospital. The iodized tent may be used as a supplement to the forcible dilatation with steel instruments, under anesthesia, in which case a somewhat larger tent may be used. He gives a technique to be used if no general anesthesia is given, as follows:

Cleanse the vagina to a degree as near sterilization as may be practicable. Introduce into the uterus an applicator wound with absorbent cotton saturated with a 10 per cent. solution of cocain. Ten minutes usually will suffice for practical local anesthesia. Carefully and moderately dilate the uterus by means of a Palmer or very small Goodell dilator. Introduce the tent. In about twelve hours, remove the tent and follow it by a larger one if additional dilatation is desired.

The author has used this plan for only a few months, and therefore cannot report upon it with any well-founded conclusions. While we believe that this method of Dudley's may be of distinct value in prolonging the effect of forcible dilatation of the cervix, and of applying an antiseptic solution to the endometrium, we should most emphatically object to it without having the patient completely anesthetized, and the external genitalia and vagina disinfected with all possible care.

Removal of Ureteral Calculus under the Guidance of the Cystoscope. Gellhorn¹ describes a method of removing renal calculi impacted in the ureteral opening and projecting into the bladder. The method consists of exposing the ureteral orifice through a cystoscope, the bladder being distended with water, and introducing a slender alligator forceps, such

¹ Surgery, Gynecology, and Obstetrics, 1911, xiii, 578.

as used by laryngologists for extracting foreign bodies from the upper air passages into the bladder, alongside the cystoscope, the latter remaining *in situ*. The accompanying sketch illustrates the procedure as carried out in one patient, in a diagrammatic fashion (Fig. 60).

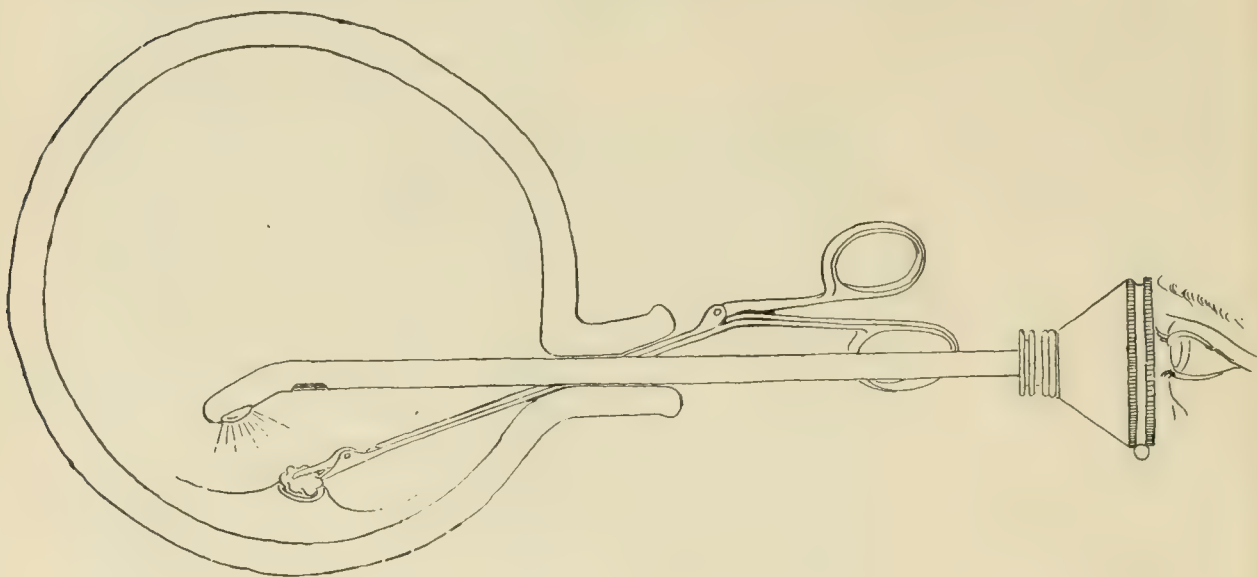


FIG. 60

The passage of the instrument through the urethra offered no difficulties, as the sensibility of both urethra and bladder had been reduced by a preliminary injection of a 2 per cent. alypin solution. The alligator forceps was pushed inward along the stem of the cystoscope until the beak of the forceps appeared in the cystoscopic picture.

It was an easy matter to bring the forceps and the stone into the same field of vision, and under guidance of the eye, the concretion was now grasped with the forceps and pulled out of the ureteral opening. The cystoscope was then removed first, and the stone delivered through the urethra. During the attempt at obtaining a good hold on the stone, three tiny fragments were broken off, which were left behind for spontaneous expulsion. At a subsequent cystoscopic examination, these fragments were no longer discoverable.

The entire procedure had taken but a short time, and had been accompanied by very little discomfort on the part of the patient. The stone itself measured $\frac{3}{4}$ cm. in length. It was of fairly pyramidal shape, the base of which measured a little more than $\frac{1}{2}$ cm. Its surface was uneven, composed as it was of numerous coral-like excrescences. This method possesses the advantage of not requiring anything more than the ordinary cystoscope, and a few inexpensive instruments.

Formation of an Artificial Vagina. After discussing the various ways in which it has been attempted to create a vaginal tube in cases where this was congenitally lacking, Schubert¹ describes the following opera-

¹ Zentralbl. f. Gyn., 1911, xxv, 1017.

tion, which he has recently performed on a patient, aged twenty-four years, in whom the entire genital apparatus was represented merely by a fibrous cord, the size of a lead pencil, between the bladder and rectum.

An incision was made beneath the urethra, and a cavity 10 cm. deep excavated between the bladder and the rectum; this was temporarily filled with gauze. A circular incision was then made about the anus, the rectal mucosa freed from the sphincter for a distance of about 3 cm., and temporarily closed by suture to prevent the escape of feces, leaving the sphincter intact. The patient was then placed on the side, and the coccyx resected. The pelvic fascia was next cut through, and, at a point 12 cm. above the anus, the rectum was freed for a short distance from all its attachments, and cut through, thus giving a segment 12 cm. long which was free at both ends.

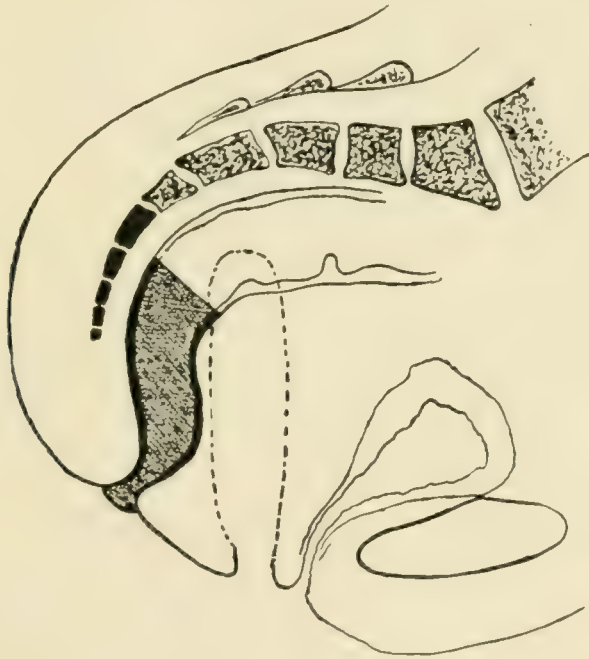


FIG. 61

The next step was to mobilize this segment by cutting some of its attachments sufficiently to allow it to be slid forward to form the new vagina, its upper end being inverted to form a blind sac; its lower end, which at the beginning of the operation had been temporarily closed, was reopened, drawn down, and attached to the edge of the newly-formed vaginal introitus. In a similar manner, the severed end of the remaining portion of the rectum was drawn down through the sphincter and fastened there, the rectal mucosa being united to the external skin. (In Fig. 61 the shaded portion of the rectum represents the part which was taken to form the new vagina, indicated by dotted lines; the resected coccyx is shown in solid black.)

The result of this ingenious though somewhat complicated procedure was the production of a vagina which showed practically no tendency

to contract, although only a few dilatations were practised shortly after operation. Not the slightest trouble from the rectum was experienced, the function of the sphincter being fully preserved.

In a subsequent article, Schubert¹ reports two further cases in which he has performed the same operation, with very slight modification, having attained an entirely satisfactory result in both. He considers his method much preferable to the isolation and use of a segment of ileum, as in the former the peritoneum is not opened at all, and the operation is simpler and less dangerous. Stoeckel,² however, prefers the latter method, and in an article accompanied with excellent illustrations describes a case in which he isolated a section of the ileum a short distance above the ileocecal valve, restoring the continuity of the gut by a lateral anastomosis, and then brought down the isolated section, with its mesentery, in a U-shaped manner into an opening made between the bladder and the rectum. So far as he knows, this is the eighth case of this so-called "Baldwin operation" on record; the immediate results were entirely satisfactory, and he hopes to report at some future time on the subsequent course of the case.

Operative Treatment of Cystocele. Brenner³ says that since the only fixed portion of the bladder is the region of the trigonum, and that since this is always the part first involved in the formation of a cystocele, which can occur only when the union between the bladder and the anterior wall of the cervix uteri has given away, it seems rational to treat cystocele by restoring these lost anatomical conditions. He does this by a combined vaginal and abdominal operation. First the bladder wall is exposed from below, and the redundant portion turned in by means of two purse-string sutures; this is followed by a posterior colporrhaphy and perineorrhaphy.

The abdomen is then opened by a transverse fascial incision, the peritoneum is incised from one round ligament to the other, and dissected downward until the turned-in bladder diverticulum comes into view. The vesical ends of the ureters are exposed by blunt dissection, and the infra-ureteral portion of the bladder wall puckered together with one or two fine sutures, great care being taken not to disturb the course of the ureters. The object of these procedures is to secure a primary point of resistance below the ureters and mid-section of the bladder, and above the vaginal vault. The next step of the operation is to sew this portion of the bladder to the anterior cervical wall by means of a transverse running suture, a second similar stitch being placed higher up, nearer the bladder-fundus. The operation is concluded by closure of the peritoneal incision and suspension of the uterus (Fig. 62).

¹ Zentralbl. f. Gyn., 1912, xxxvi, 198.

² Ibid., 1912, xxxvi, 7.

³ Monats. f. Geb. u. Gyn., 1911, xxxiii, 464.

The author claims that the result obtained by this infra-ureteral suture cannot be obtained without performing a laparotomy, as the ureters cannot be dissected out from below without injuring their attachments, and if they are not dissected out, there is too much danger of including them in the suture, or of, in some way, kinking or injuring them. He says that in most of these cases, a retroversion of the uterus is present, which requires a laparotomy under any circumstances.

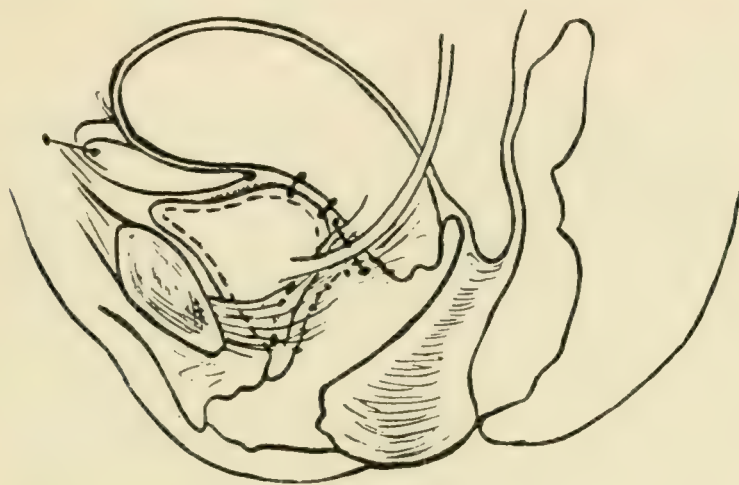


FIG. 62

Operation for Complete Tear of Perineum. Ill¹ reports a series of operations for complete tear of the perineum. There were 56 cases. The most recent one was of five months' standing. A secondary operation of this character should never be done until all the tissue is soft and pliable.

The operation which Ill has performed is a combination of the Tait and Snger, to which he has added some improvements. For two days before the operation, careful attention should be paid to the bowels and diet, in order to leave as little residue in the bowel as possible. During the operation, no sponges or pads are used, the wound being kept clean by irrigation. The operation is described by the author in six steps, as follows:

The Incision. This is made by following distinct landmarks which he illustrates. The incision takes on an H-shape, with the lower upright bars very short and slightly curved inward. The lateral incision begins at the location of the most posterior caruncle remaining from the hymen. If perchance they are entirely obliterated, the incision should begin a little to the outward and behind the orifice of Bartholin's gland. It is continued downward and backward, and just outside and behind the dimple which indicates the torn sphincter.

The cross-bar of the H is carried exactly across at the junction of the mucous membrane of the rectum and the vagina, and reaches

¹ American Journal of Obstetrics, lxiii, 118.

each upright bar just anterior to the dimple of the retracted sphincter. A wound of the mucous membrane of the rectum at any point is avoided. All this can best be done with a very sharp, short-bladed knife when the tissue is put on the stretch by assistants on each side, and that in a few moments of time.

The Flap-splitting. This is now conducted by grasping the corner of one upper angle and with scissors trimming up as high on the vagina as is indicated by the retracted levator ani. The other upper side is treated likewise. Now the very important denudation of the sphincter ends is accomplished by grasping the lower corner of each side and cutting downward and backward, making a comparatively thin flap. Ill is always anxious to have free bleeding, as it insures good union. No tissue is removed unless it looks damaged from great thinness of the flap. This commonly occurs at the edge of the wound. The result of all this is a large wound with an irregular square outline.

The Third Step. This consists in suture of the rectal mucous membrane, and for it the very finest plain catgut on a fine, slightly curved needle should be used. The suture begins exactly in the middle of the posterior wound, and never touches the mucous membrane of the rectum. It is entirely buried in the raw surface, each end of the suture being threaded into the needle with which a double line of suture is made. The last stitch of each side comes out in the skin just inside and behind the sphincter, and is tied outside. Every stitch is taken very superficially. He uses a very fine suture that it may absorb in three or four days, which very effectually keeps any rectal discharges from the wound.

The Suture of the Perineum. This constitutes the next step, for which he prefers to use a very pliable silver wire, made of as pure silver as can be obtained, which should be well annealed. The suture may be taken by a curved round needle, or, as he prefers, a Crofford needle. They should all enter the skin just at the border of the wound, so that no skin will be drawn into the wound. The first suture is passed just within the curve of the sphincter; the second through the sphincter itself; and the third just anterior to the sphincter. Each suture takes a sweeping curve so that the tissue will not be puckered, but rather spread out when the sutures are tightened. The sutures are now continued in the same way, taking wide sweeps up as high as the beginning of the upright bars of the incision H. The sutures will rarely appear in the wound.

The Fifth Step. The fifth step of the operation consists in suturing the vagina. A fair-sized plain catgut should be used. The sutures must start at the middle of the anterior part of the flap formed by the anterior incision of the crossbar of the H. It should be a continuous suture. This will insure an elevation of this flap into the vagina. Now the silver wire is twisted down with the greatest care, shouldering the strands and holding them horizontally with a tenaculum.

Great exactness in the coaptation of the wound can and should be secured, and with the least tension. The twisting of the suture begins at the new anal orifice, and care is exercised to see that the ends of the sphincter come together without tension and without drawing a flap of the skin between them. The suture of the vagina is now continued from the new fourchet down the perineum, and tied an inch above the new anal orifice.

The silver wires are cut to about three inches in length, and held together by a piece of fine rubber tubing. The operation is now finished. The sutures are cut on the ninth day and removed the next day.



FIG. 63.—Shortening of the uterosacral ligaments. The mucous membrane of the vagina has been divided circularly around the cervix and pushed upward so as to expose the uterine insertion of the ligaments: *L*, ligament; *P.V.*, cut edge of mucous membrane of posterior vaginal wall.

It would be unnecessary to use silver wire sutures as described by Ill, silkworm gut doing quite as well, although some may prefer silver wire. We have done this operation in practically the same way, except that a denudation is made without any flap-splitting, and catgut is used throughout, the crown sutures being introduced subcutaneously and covered with a subcuticular running suture. This

makes an ideal operation, and in our hands has been followed by no failures.

Vaginal Shortening of Uterosacral Ligaments. Jellett¹ describes a new operation for the vaginal shortening of the uterosacral ligaments. He declares that it is indicated in cases of prolapse of the uterus, due to, or associated with, elongation of these ligaments. It may be combined with the Wertheim operation if there is a large cystocele, and with other plastic operations, according to the conditions present. He describes the operation as follows:

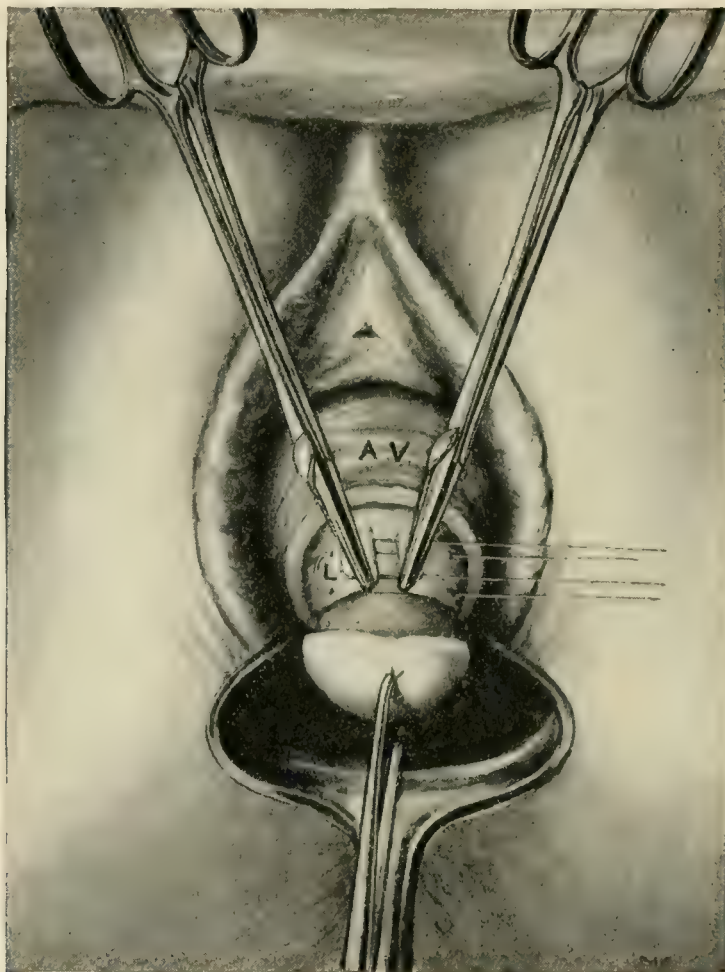


FIG. 64.—Shortening of the uterosacral ligaments. The ligaments have been freed from their attachment to the uterus and brought around in front of the cervix. The fixing sutures are inserted: *L*, ligament; *AV*, anterior vaginal wall.

The first step consists in dividing the vaginal mucous membrane around the cervix, as if for a vaginal hysterectomy. The mucous membrane is then pushed upward all around, so as to expose the entire length of the cervix. If the cervix is now drawn forcibly forward, the insertion of the uterosacral ligaments can be easily seen.

The second step consists in catching each ligament separately with an artery forceps quite close to the uterus, and then in dividing the

¹ Surgery, Gynecology, and Obstetrics, 1911, xiii, 206.

ligament with scissors between the forceps and the uterus. It is unnecessary to open the peritoneum to do this, but if one has any doubt as to whether one has actually caught the ligament, it is perhaps better to open into Douglas' pouch. A finger passed into the pouch can then easily palpate the ligaments, and if at the same time one pulls the forceps gently downward, whether the forceps has caught the ligament or not. Each ligament is then drawn gently downward, and freed from its attachment to the peritoneum, so as to allow it to be pulled down still farther.



FIG. 65.—Shortening of the uterosacral ligaments. The sutures which fix the ligaments in their new position are tied: *L*, ligament. The cervix is shown here at the level of the vaginal outlet for the sake of clearness. In practice it would lie high up in the vagina. The sutures which bring back the vaginal cuff into position would also be inserted at this stage, and tied posteriorly and laterally. Anteriorly they are tied as soon as the suture of the ligament is complete.

If there is no cervical hypertrophy or vaginal eversion, the third step consists in bringing back into position by sutures the vaginal cuff which has been pushed upward, off the posterior and lateral aspects of the cervix. The anterior portion of the flap is left unsutured for the moment. Before fixing these flaps, the forceps holding the ligaments are drawn forward, so as to bring the ends of the ligaments around in front of the cervix.

As soon as the continuity of the vaginal wall has been restored everywhere except in front, the ligaments are drawn tightly out through the opening remaining in front of the cervix, which is pushed up to its

normal level in the vagina. Each ligament is then sutured in turn to the anterior surface of the cervix in such a manner as to keep the cervix at the level to which it has been pushed, or they may be sutured to one another below the cervix, as shown in the drawing. Any excess of ligament is then removed, and the remaining portion of vaginal mucous membrane is brought back into place with sutures.

Jellett thinks that by combining his operation with that of Wertheim it is almost impossible for a recurrence to take place.

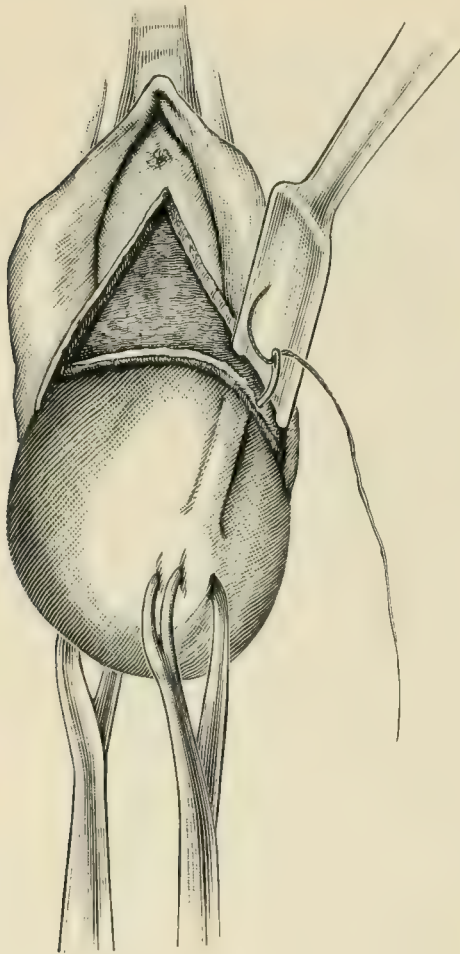


FIG. 66

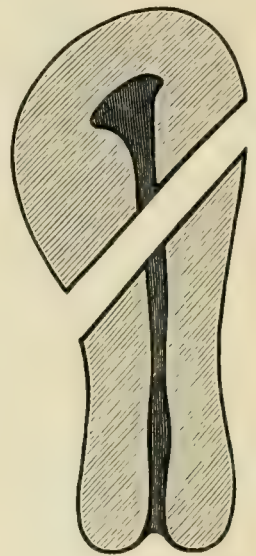


FIG. 67

Vaginal Amputation of the Fundus Uteri. Rieck¹ advocates partial resection of the uterine body for the cure of all forms of severe bleeding, especially in cases of menorrhagia in young women, where the loss of blood at each period is so great that something must be done, everything short of surgical intervention having failed. The great advantage of this procedure is that while excessive bleeding is cured, menstruation is not entirely done away with, and thus the patient does not feel herself unsexed. The author believes this operation to be easier and simpler than any other that has been suggested for the same

¹ Zentralbl. f. Gyn., 1912, xxxvi, 70.

purpose, and that it offers a certain, quick, and almost entirely safe method of regulating excessively copious menstrual bleeding.

The technique is briefly as follows: After having pushed the bladder off from the cervix, a small transverse incision is made in the peritoneum as near as possible to its uterine reflexion. The fundus of the uterus is now seized with two forceps, and drawn forward through the opening; the peritoneum is then stitched around it, completely closing off the peritoneal cavity, the ovaries, and greater portion of the tubes remaining in the abdomen (Fig. 66). Having ligated on each side the tube, ovarian artery, and uterine anastomosis (the latter just below the point where resection is to be made), the fundus is amputated by an oblique cut, running downward and forward (Fig. 67), ending on the anterior surface at about the level of the junction of the corpus and cervix, thus preserving 1 to 2 cm. of the corpus mucosa. The two halves of the vaginal mucous membrane are now stitched directly onto the resulting cut surface, which, on account of its oblique direction, more or less parallels that of the vagina; this serves to check hemorrhage. A fine running catgut stitch to unite the edges of the vaginal mucosa completes the operation, usually no drainage being necessary. The author reports several cases treated in this manner, in which a condition of very severe menorrhagia was reduced to one of normal regular menstruation.

Conservation of the Ovaries in Women Near the Menopause. Dickinson¹ has made a series of observations concerning the conservation of sound ovaries and tubes in hysterectomies near the menopause. His observations are based on 200 consecutive histories of individuals operated on more than six months previously. The primary mortality was 6.5 per cent., chiefly among cancer cases. Omitting them, and, in addition, 5 relatively early recurrences of malignant disease, and also 18 women beyond the climacteric at the time of operation, there remained for comparison, 164 cases. The summary of Dickinson's conclusions is as follows:

Conservation of ovarian structure after hysterectomy shows four-fifths of the patients free from marked disturbances of the surgical menopause. The results are somewhat better where both ovaries remain, than where one is left or where resections are done.

Where the disturbances do occur, their character is less severe and more gradual than after bilateral removal of the ovaries. In married women, conservation shows nearly uniform persistence of sexual desire.

The practice of removing ovaries when taking out a uterus at or near the time of the menopause is to be strongly opposed, except in cases of malignant disease or of definite ovarian infection. Conservation after operations for incurable tubal infections leaves more tender and

¹ Transactions of American Gynecological Society, xxxvi, 324.

troublesome ovaries than conservation following hysterectomies for fibroids, prolapse, or the hemorrhages of chronic metritis.

After the removal of the uterus—particularly for large fibroids—whether one or both ovaries remain, ovarian edema or hypertrophy is frequent. The menopause, *i. e.*, cessation of ovarian function, is likely to occur earlier than the average time in a woman who has lost her uterus.

To preserve the functional activity of the ovary, its circulation must not be impaired. Removal of the tube frequently compromises the ovarian blood supply, and is a delicate and unnecessary adjustment. Barring diseased and closed tubes, and malignancy and tuberculosis, the tube should remain. In the 41 cases in which one or both tubes were left, no harm resulted. The broad ligament is a structure which must be respected and preserved as much as possible in the surgical procedure.

Radical versus Conservative Methods in Hysterectomy. Polak,¹ in a series of 132 hysterectomies, operated upon since January 1, 1906, has compared the results of removing both tubes and ovaries with the conservation of one or both ovaries. Ninety-six of these hysterectomies were done for fibroid tumor of the uterus, and 31 for pelvic inflammatory disease, 3 for malignant disease of the uterus, and 1 for arteriosclerosis.

Of the 96 women who were operated upon for fibroid tumor, both ovaries were removed in 48, or 50 per cent., while one, a part of one, or both ovaries were conserved in an equal number. Seventy-five cases have been followed, and accurate notes kept of their general and local conditions, for periods bearing from a few months to nearly five years.

Forty-three of these women had both ovaries removed, and have been completely relieved of all pelvic pain or symptoms; in 11 there was for a time lumbosacral backache, which was cured by proper corseting; 3 suffered from flushes; 1 suffered from marked nervous phenomena, while 39, or over 90 per cent., enjoyed perfect health. In 32 women in whom both ovaries, or one ovary, or a part of an ovary was left, 5 had pain in the retained ovary, and on examination it was enlarged, tender, and somewhat fixed; 3 of the women suffered from nervous phenomena, which could hardly have been worse.

These 3 women, and the one suffering from nervous phenomena in the first series, are all over fifty years of age. In a series of 30 cases of hysterectomy for pelvic inflammatory trouble, 30 are living and in touch with the author; 28 are in perfect health; 1 suffers from flushes, which recur at varying intervals and seem dependent upon the condition of her general health. They all were aged under forty years at the time of operation. The only patient in whom an ovary was conserved in this series has occasional pain at the site of the retained ovary, but no nervous distress.

¹ Transactions of American Gynecological Society, xxxvi, 329.

The author thinks that nervous symptoms are less likely to be present after complete hysterectomy for inflammatory conditions than after complete hysterectomy for fibroid tumor. This is probably because in the pelvic inflammatory patient there is more likely to be septic intoxication than in the patient having a fibroid tumor. Improvement is more marked, also, in fibroid cases in which the blood has been in very bad condition previous to the operation.

An Improved Suprasymphyseal Incision. Roberts¹ has described an improved method for approaching the lower abdomen. He has used it in a series of about 300 cases. After reviewing what he considers the disadvantages of a median central incision, he describes his method, which is based on the principles promulgated by Pfannensteil.

He employs a keen-bladed, hollow ground knife with offset handle to make a semicircular skin graft incision four or five inches in length, and so placed that it is all, or nearly all below the pubic hair line, and the centre of its convexity comes just above the pubic symphysis. In making this incision the knife is held at such a slight angle to the skin that it cuts a graft from one-fourth to one-third of an inch long before it reaches the subcutaneous tissue; at this point the skin graft knife is laid aside, the graft is wiped back, and the incision continued in the usual manner with a scalpel down to the fascia of the external oblique, which is bared by gauze wiping.

In traversing the fat layer the incision is carried somewhat upward till it reaches the external oblique about one and one-half inches above the pubic border; the anterior rectus sheath (conjoined fibers of the external and internal oblique and transversalis) is cut from linea semilunaris to linea semilunaris, exposing the perpendicular fibers of the rectus abdominis on each side as well as those of the two pyramidales, when these little muscles are present.

From the ends of this incision (which is usually about two and one-half inches long), an incision is made which *splits* the fibers of the external oblique upward and outward for two or three inches, and also a similar incision which *splits* the fibers of the internal oblique outward toward the pelvic wall in a direction which carries the incision under the lower portion of the external oblique—the transversalis being hardly distinguishable in this location.

Now this flap lying anterior to the recti is lifted up and the fibers dipping down between the recti are cut as the lifting process goes onward, until the recti are bared four or more inches of their length. The recti are now separated, the right rectus being slid from under the right pyramidalis and the peritoneum opened longitudinally and in the usual manner.

The author and his assistants wear sterile rubber gloves, linen sleeves,

¹ Surgery, Gynecology, and Obstetrics, 1911, xiii, 684.

and gauze face masks, and from the time the incision reaches the abdominal fat, the entire skin surface is covered with moist gauze so that only the wound itself is exposed, and throughout the operation the most careful and consistent aseptic technique is maintained.

When the intra-abdominal procedure has been completed the wound is closed throughout with No. 1 plain iodine catgut (Bartlett process), the sutures being introduced as follows:

1. One continuous suture enters the border of the left rectus or pyramidalis at the lower limit of its separation, and then passes back and forth through the peritoneal borders in such a manner that these edges are turned out and broad peritoneal surfaces are approximated; when this line of suture has reached the upper limit of the peritoneal incision, the last stitch goes up through the border of the right rectus and begins a continuous suture of the rectus borders, consisting of not more than four stitches terminating at the lower end of the incision where the thread is tied to the other end of the peritoneal suture which has meantime been held by a forcep. This double line of very fine catgut, having only a single square knot, holds in adequate approximation the peritoneal borders, and at the same time maintains such a position of the recti that they are bound to heal to their anterior sheath without separation, no matter how vigorously the patient may cough or vomit.

2. Another long strand of No. 1 catgut, having a forcep attached to its end, approximates the separated fibers of the oblique abdominal muscles as follows: On the patient's left side it pierces the lower edge of the external oblique, and then of the internal oblique, and transversalis (about an inch lower down and underneath the external oblique); it now, as an over and over stitch, approximates the edges of the internal oblique and transversalis as far as the left linea semilunaris (only two or three stitches), when it begins to involve all muscles in front of the recti as far as the right linea semilunaris. To the right of the semilunaris the suture again approximates the separated fibers of the internal oblique and transversalis only, but the last stitch goes up to the upper border of the external oblique at the limit of the incision on the right, where it begins to return to the point of starting—involving the external oblique only as far as the right semilunaris. Then in front of the recti the stitches are placed between those of the earlier portion of the suture and on the left side, closing the external oblique and being tied to the beginning of the strand. This second strand has now approximated the separated fibers of the three oblique muscles in lines absolutely parallel, with their fibers in such a manner that there is no appreciable strain upon the catgut.

3. A single strand of the same sized catgut now closes the skin wound as a subcutaneous, not subcuticular stitch, leaving the original skin graft or flap unattached, as it was when the skin graft knife was laid aside. The fat layer is allowed to take care of itself, our only

precaution being to accomplish perfect hemostasis and to squeeze the air out of the deeper portions of the wound before the subcutaneous suture is tied. The skin flap is now fastened in place by means of strips of sterile court-plaster, three-fourths of an inch wide and one and one-half inches long, which approximate the edges with perfect accuracy, leaving uncovered interspaces of about one-fourth inch. These strips of court-plaster complete the dressing, a sterile towel is placed over the wound while the patient is being taken to her bed, but the incision is then exposed to the air for an hour or so until it is thoroughly dry, when the abdomen is treated as though there were no incision, except that it is under no circumstances washed. If a little blood or serum oozes from the wound between the plaster strips, it is absorbed by a piece of sterile gauze and the exposure is continued; drying of the wound, resulting as it does in the formation of a delicate crust of dried blood or serum, seems to be the keynote in this, nature's perfect method of healing. The patient begins to sit up as soon as she chooses, and the court-plaster strips are removed on the fifth day.

Between April 19, 1906, and June 24, 1911, Roberts has used this method in 301 cases; 270 were primarily clean cases, and of these 10 had wound infection. The mortality in the clean cases was 1.11 per cent. The mortality including all cases was 1.66 per cent.

DISEASES OF THE BLOOD. DIATHETIC AND METABOLIC DISEASES. DISEASES OF THE THYROID GLAND, NUTRITION, AND THE LYMPHATIC SYSTEM

By ALFRED STENGEL, M.D.

THE BLOOD

Leukemia.—It is more than usually difficult this year to present the interesting points concerning leukemia which have appeared in the recent literature owing to a certain change in the character of the articles on this subject. Briefly, this change may be said to depend upon a more scientific attitude toward the leukemias and a more painstaking study of such cases as have presented themselves. This is certainly a welcome improvement, not that any appreciable benefit has as yet developed, but that there is hope for advancement only where there is careful scientific investigation. In view of the above, it may perhaps be pardonable if, after a brief résumé of a few of the articles on various aspects of leukemia, a fuller discussion of the status of one of the newer considerations is introduced.

ETIOLOGY. No noteworthy contribution has been made to our knowledge of the etiology of any of the leukemias in the recent literature, although apparent etiological factors are constantly discussed. The relation of a previous malarial infection has long been considered, and in the last year two cases of leukemia with such a history were reported, one by Lichty¹ and one by Solomon.² The case reported by Lichty gave a history of malaria many years previously which might have been considered sufficient cause for the very marked enlargement of the spleen. During the patient's final illness the blood was examined carefully and no changes found until the last few days, when a marked leukocytosis developed which was diagnosticated as an acute leukemia. Solomon's case occurred in a soldier in the Philippines who had had severe malaria. He was an alcoholic, and became insane at the age of thirty. Examination of the blood revealed evidence of a myelogenous leukemia. I cannot resist mentioning here Thomson's³ report

¹ Cleveland Medical Journal, October, 1911, x, No. 10.

² Medical Record, June 17, 1911.

³ Annals of Tropical Medicine and Parasitology, April, 1911.

of his study of the peripheral blood of quiescent or apparently cured cases of malaria. In 40 cases he found that, for long periods after becoming afebrile, these cases showed a very marked leukocytosis at the time of the day at which the chill and fever occurred during the previous active malaria. This leukocytosis, in one case, reached the very remarkable figure of 125,000 per c.mm., a height which is very rarely seen except in leukemia.

In the analytical article of Kurt Ziegler¹ he analyzes 33 cases of chronic myeloid leukemia, among which 4 cases seemed to have developed following contusions of the spleen and 1 in the course of a pernicious anemia. On the other hand, C. Sternberg² reports 2 cases of previously healthy children who, during convalescence from scarlet fever, developed varicella, and, in connection with this, a fatal hemorrhagic sepsis. The autopsy findings were characteristic of acute myeloid leukemia. Animal inoculations with cultures from the two children confirmed the presence of a streptococcic infection. Sternberg concludes, from these observations and from experimental investigations, that acute myeloid leukemia is no special disease entity, but a general infection with unusual involvement of the blood-forming apparatus. Three cases of acute leukemia in children were studied bacteriologically by Thue,³ with constantly negative results.

The case of lymphatic leukemia reported by Woodward⁴ gave a history of enlargement and suppuration of the left axillary lymph nodes two years before the apparent onset of the leukemia. The glands remained enlarged, and two years later the other glands of the body also enlarged, and a blood count shortly after revealed a chronic lymphatic leukemia with a white cell count of 781,000 per c.mm., of which 98.6 per cent. were small lymphocytes. In this case, the earlier infection may have played some part, since it left the glands permanently enlarged. Many authors have emphasized the fact that both lymphatic leukemia and Hodgkin's disease seem to first attack groups of glands which have been enlarged for some time.

The report of von Jagic, Schwarz, and Siebenrock⁵ is of interest in this discussion. The authors report 3 cases of lymphatic leukemia in *x*-ray workers, and one in a chemist working with radium. The etiological factor in these cases seems probably to be a too-protracted stimulation of the lymphatic apparatus, since a study by the authors of the blood of ten healthy *x*-ray workers showed an almost constant lymphocytosis. These cases of lymphatic leukemia are therefore somewhat analogous to the skin cancers caused by the *x*-rays, and this is a

¹ Zeit. f. klin. Med., Band lxii, Nos. 1 and 2.

² Wien. klin. Woch., November 23, 1911, xxiv, No. 47.

³ Norks. Mag. f. Laegevidenskaben, July, 1911, lxxii, No. 7.

⁴ Lancet Clinic, April 1, 1911.

⁵ Berl. klin. Woch., July 3, 1911, xlviii, No. 27

further argument to be added to the many we already have for considering leukemia as neoplastic. The only article in any way suggesting a transmissibility of leukemia in the year's literature is by Vie.¹ In this article, he reports 2 cases of leukemia in one household.

SYMPTOMS AND COMPLICATIONS. *Oral conditions* occurring in the course of a leukemia have come in, as usual, for some discussion in the literature of the last year. That the underlying cause of such local conditions is frequently not promptly enough recognized is shown by the following case reported by Jochmann and Blutorn.² The case occurred in a man, aged forty-four years, who gave a negative previous medical history, and had been in good health until fourteen days before coming under observation when he was taken ill with influenzal symptoms. A day later a small growth appeared in his mouth which was diagnosticated as a gangrenous chancre. The symptoms became progressively worse, and the condition in the mouth spread rapidly. Examination was negative, except that his spleen and liver were both enlarged, and that he presented the appearance of an intense anemia. Spreads from the mouth were negative for the organism of diphtheria or of Vincent's angina. A blood examination finally disclosed a severe anemia, with 90,000 white blood cells per c.mm., of which 90 per cent. were myeloblasts. The count later rose to 193,000 per c.mm. a few days before death. The authors explain the mouth condition as a streptococcic infection of the leukemic infiltrations which occur in the mucous membranes of the mouth, nose, and accessory cavities, and even in the intestines, there giving the picture of a typhoid fever. Jackson³ reported 2 cases of disease of the gums in the course of leukemia, of which the first was thought to be a purely local condition and the second was diagnosticated as scurvy. Another case in which, however, the lips were involved by a leukemic process is reported by Dencker.⁴

Involvement of the skin and mammary glands was also seen in Dencker's case of lymphatic leukemia. In addition to lymphoid infiltration of the skin of the nose and lips, the mammary glands were found replaced by a mass of lymphoid tissue, which, microscopically, was found to have almost completely taken the place of the normal gland structure. This condition is similar to the lymphomata found in the lacrymal, parotid, or maxillary glands, a case of which is reported by Tileston.⁵ This was seen in a child, aged two years, who presented, in the course of what the author calls an aleukemic lymphatic leukemia, a picture identical with the syndrome of Mikulicz disease. Skin involvement

¹ Ugeskrift f. Laeger, lxxii, No. 51.

² Folia Haemat., October, 1911, Band xii, Heft 2.

³ Association American Physiology, May, 1911.

⁴ Journal of the American Medical Association, lvi, 417, No. 6.

⁵ American Journal of Diseases of Children, November 2, 1911, i, 293, No 5.

is quite common in leukemia, and Hazen,¹ in addition to 3 cases of his own, reviews about 60 cases from the literature and comes to the conclusion that there is a group of cutaneous lymphomata and lymphosarcomata which includes leukemia, pseudoleukemia cutis, lymphosarcomatosis cutis, lymphoderma pernicioso, mycosis fungoides, and the closely related lesions of chloroma and myeloma. In Ziegler's² analysis, several cases of lymphatic leukemia showed subcutaneous nodules, and one of the myelogenous cases showed an intense gangrene of the skin, with fatal hemorrhage.

Under the heading of *nervous manifestations*, Badouin and Parturier³ give a careful report of a case of *paraplegia* from softening of the cord in the course of a myelogenous leukemia. The lesion was due to a plugging of the capillaries with myelocytes, and occurred at the level of the sixth dorsal segment. The area of softening measured 2 cm. in height, the gray matter being completely necrosed, the white less so. The authors collected 25 cases from the literature, which they analyzed—8 cases of hemorrhage into centres of variable importance occurred in leukemias, usually of the acute type; in 7 cases, the nervous phenomena were due to leukemic infiltrations, 2 in the cranial nerves. Exceptionally, symmetrical degenerations have given clinical symptoms suggesting tabes. As a rule, the lesions present themselves as small areas of acute myelitis, at first showing swelling of the axis cylinder, then disappearance of the myelin with fragmentation of the axis cylinder.

Terrier and Dujarier are quoted⁴ as stating that, of 48 cases of *priapism*, 16 were due to leukemia.

Myeloid transformation of the spleen is discussed by Richard Hertz,⁵ and some experimental results reported. This condition has excited interest for a long time, since Ehrlich first described myeloid elements in the spleen of leukemias which he explained as metastases by the blood; an opinion which he himself has forsaken, and which is held today only by Helly, Ribbert, and Banti. Ribbert, who considers leukemia a neoplastic process, holds the opinion that myeloblasts and myelocytes are carried from the bone marrow by the blood stream to be deposited in other organs, there to behave as neoplastic cells. It was Dominici who was first able to prove their development in the spleen and to produce, experimentally, a myeloid change in animals. There are various opinions held concerning from what cells in the spleen the myeloid elements arise, and etiologically experimental results are no less discordant, since some have obtained changes in cases of intoxi-

¹ Journal of Cutaneous Diseases, xxix, No. 10, and Washington Medical Annals, July, 1911.

² Loc. cit.

³ Rev. Neurologique, June, 1910, p. 673.

⁴ Dentu and Delbet, System of Surgery, Paris, 1912.

⁵ Arch. des mal du cœur, des vaisseaux et du sang, 1911, iv, No. 5.

cations, infections, and after hemorrhages. The author's experiments were carried out on rabbits, since the spleen of this animal does not normally contain any myeloblasts or myelocytes. He obtained some positive findings in 3 of 8 rabbits rendered anemic, but, on the whole, his work is indefinite and no conclusions should be drawn. On this subject Clerc,¹ after quoting the work of Roger and Josuè, Dominici, Bezancon and Labbè, and Herschfeld, showing that hemopoietic tissue reacts in infections, intoxications, and in anemia, states that it is known that just as the hemopoietic centres can undergo hyperplasia, retaining their normal type, so also it is known that there are deposits of cells outside the centres which may proliferate as either lymphoid or myeloid cells. If the stimulation is very intense, the primitive undifferentiated forms appear. The resulting leukemia is an accessory phenomena, and not the result of a primary blood lesion. The study of the pathology of the hemopoietic system permits the conclusion that inflammatory hyperplasia, diffuse hyperplasia, and neoplasm can be considered as three histological varieties between which all transition stages are possible.

BLOOD. Of the cases of leukemia with unusual blood pictures reported during the last year, none is more interesting than Veeder's.² The case occurred in a female infant, aged seventeen months, who presented a striking picture. The skin was pale, and showed a widespread, purpuric eruption varying from small, petechial spots about pin-head in size to large, subcutaneous extravasations, cyanotic in color, and several cm. in diameter. There was a general, moderate enlargement of the lymph nodes. The condition was of acute course, the eruption having appeared only five days before the examination. The blood count was very remarkable—the hemoglobin, 55 per cent.; erythrocytes, 3,370,000 per c.mm.; leukocytes, 1,330,000 per c.mm. Stained specimens showed the field so crowded with lymphocytes as to almost obscure everything else. The lymphocytes showed two distinct types, a small and a large cell variety, but between these two extremes there were so many gradations in size that an accurate subdivision was impossible. The differential count of 1000 cells was: Lymphocytes, 98.5 per cent.; polymorphonuclears, 1.2 per cent.; myelocytes, 0.3 per cent. One nucleated red cell was seen during this count. This case exemplifies the well-known fact that the hemopoietic apparatus in children, being in its developmental stage, reacts more violently than in adults, and that its lesions cannot absolutely resemble those of adults.

Veeder's statement that it was impossible to distinguish between the varying sized lymphoid cells brings to one's mind Pappenheim's classification of lymphoid cells with its seven varieties; small lympho-

¹ Presse Méd., 1910, No. 37.

² Archives of Pediatrics, January, 1911.

cyte, lymphocyte, lymphocyte of large size, large mononuclear and transition forms, these four forming the normal types, and the large lymphocyte and atypical large lymphocyte being the abnormal forms, the latter being the same as the cell of Rieder, spoken of in German literature. This subject of the lymphoid cells is well discussed in an article by Coic,¹ who also gives an excellent bibliography. Three cases of lymphatic leukemia in children are recently reported by Cheney,² all of which are quite typical and show nothing unusual. The blood picture presented by the case reported by Jochmann and Blüdorn³ is of interest, and deserves to be briefly quoted. The picture was characteristic of an acute myeloid leukemia with the large, ungranulated, basophilic, mononucleated cells, which are recognized as the progenitors of the myelocytes, as the prominent feature. These cells, in this case, responded negatively both to the test for proteolytic digestion of Löffler's serum, and to Schultze's oxydase reaction. For these negative findings the author advances the explanation that the cells were too unripe to contain either ferment. The diagnosis was made by microscopic studies of organs and also by the myeloid infiltration of the spleen, liver, kidneys, and myocardium, none of which infiltrations, however, contained any proteolytic ferment. The authors found vacuoles in the myeloblasts, when stained with Giemsa, which were sharply circumscribed, elliptical, and of varying size, occurring frequently but never more than one in a cell. These vacuoles were first described by Auer, and later Pappenheim and Herschfeld added the detail of a single red azure granule in the centre of the vacuole. These also were observed in this case, and occasionally suggested the well-known Kurloff's bodies which are seen in the cytoplasm of the large lymphoid mononuclear cells of normal guinea-pig's blood. There has been no evidence brought forward to sustain the contention that these bodies are protozoal forms with a possible etiological significance.

Various qualities of leukemic blood have been discussed in the year's literature and may be briefly mentioned here. Clifford Allbutt,⁴ in an article on the viscosity of the blood, speaks thus of leukemic blood: "In leukemias, in spite of the low hemoglobin content in some of them, increased viscosity is often noted; and this pretty surely depends on a total increase of corpuscles, for it may be noted here that the white corpuscles count for viscosity at least as much as the red, some think for more. In splenic leukemia, Determann finds that the white corpuscles conduce, in their proportion, more to the viscosity than do the reds."

No new staining methods have been described, but Dunn⁵ warns

¹ Arch. des mal du cœur, des vaisseaux et du sang, 1911, iv, No. 4.

² American Journal of the Medical Sciences, January, 1912, cxliii, No. 1.

³ Loc. cit.

⁴ Quarterly Journal of Medicine, April, 1911.

⁵ Journal of Pathology and Bacteriology, xv.

that in the use of the oxydase reaction whereas normal blood requires but two minutes to be stained, leukemic blood should be stained for at least fifteen minutes, since all young cells, such as myeloblasts, color slowly. This may explain the failure of certain investigators, as in the case mentioned above, to obtain this reaction in cases where it might be expected to be present. This subject will be referred to again, as will also the question of the proteolytic ferment in the leukocytes.

In connection with a case of chronic myeloid leukemia which, however, showed some cells of Rieder, the author, Zoja,¹ reasons that some interesting results might be reached by establishing the relation between the destruction and regeneration of the blood elements. This can be done, he states, in the case of the erythrocytes by studying their numbers, the hemoglobin per cent., and the excreted "bilinogen," at the same time observing the presence and number of young forms. It is more difficult, he says, to do this for the leukocytes, since the urinary acidity and the purin bases are not accurate measures. His conclusions are that there is an autoregulator mechanism for the cells of the blood and, just as with the reds, production may be decreased or destruction increased, so it is with the whites. An increase may be due to increased leukopoiesis or to a decreased leukolysis. The difference between a leukemia and a pseudoleukemia lies in a variance in the equilibrium of the white blood-cell count, that is to say in the relation of leukopoiesis to leukolysis.

TREATMENT. An excellent article on the treatment of leukemia appeared during the last year by M. Sternberg.² The author recommends *treatment with the x-rays* as the most important measure, and for this he advises rest in an institution where hydrotherapy can be applied at the same time, and the patient kept under constant supervision. In ambulant cases, he emphasizes the necessity of watching the blood so as to institute another course of treatment at the first indication of an exacerbation. By this means he was able to keep a number of patients in good condition with fair earning capacity for years. He quotes several cases benefited by treatment, the most interesting of which was a woman, aged thirty-five years, whose blood showed 450,000 small lymphocytes per c.mm. X-ray treatment caused a diminution of this count to 31,000, and this improvement has persisted with a proportionate subjective amelioration. In the author's opinion, radiotherapy acts both directly on the blood-making organs and indirectly by substances generated in the circulation which have an inhibiting action on the production of leukocytes elsewhere than in the parts subject to the irradiation. He mentions that radiotherapy quite regularly improves the condition of leukemics but recurrences

¹ Folia Hemat., November, 1910, p. 224.

² Deut. med. Woch., xxxvii, 529, No. 12,

occur, and finally the treatment is without effect in many cases. Further, he also claims that he knows of 4 cases developing in men working with the Röntgen rays. As additional treatment, Sternberg advises *arsenic* during a pause in the radiotherapy, or possibly coincidentally with it, but he warns against the continuation of the use of the *x*-rays if any of the manifestations of arsenical poisoning appear, such as herpes, eczema, or paralysis, since such a herpes may progress into gangrene if the Röntgen exposures are kept up. He also mentions, as a contraindication to continued *x*-ray treatment, the appearance of large numbers of myeloblasts in the blood. He enumerates many other medicinal agents, phosphorus, bone marrow, thymus, spleen, etc., as being without beneficial action. The radio-active springs of Gastein, Teplitz, or Joachimstal, he states, seem to have a certain value. Finally, *salvarsan* has been tried and has no apparent action in leukemia. Sicard and Bloch¹ also experimented with *salvarsan* and found the total count uninfluenced, but there was a slight increase in mononuclears.

A further report on the treatment of leukemia with the *mixed toxins* of Coley was made by Larrabee,² who has previously reported 5 cases. He adds 13 additional cases, 9 of his own, 3 of Boldoff's, and 1 of Coley's. The results were negative in cases of lymphatic type but improvement was the rule in myelogenous leukemia. The treatment is only palliative and not curative, but, in many cases, it adds greatly to the comfort of the patient and no doubt prolongs life. It was to be hoped that more reports of the use of *radium* in the treatment of leukemia would appear, but only an isolated case by Parkes Weber³ has been published. In this, a classic case of lymphatic leukemia in a woman, aged sixty-three years, with 43,000 leukocytes per c.mm., of which 99 per cent. were lymphocytes, improvement followed the combined use of atoxyl and radium. In view of the fact that the injection of colloidal metals into the blood of normal individuals produced temporary leukolysis followed by a polymorphonuclear leukocytosis, Dayton⁴ hoped to be able, in myelogenous leukemia, to produce by this means a polymorphonuclear leukocytosis replacing the myelocytes, which change is said to accompany the improvement of this disease under the röntgenotherapy. He therefore administered isotonic stabilized, electrically prepared *colloidal platinum* in doses of 5 c.c. hypodermically daily, or every other day, to two patients with myelogenous leukemia. There was no apparent change in the picture or progress of the cases, nor were there any changes in the blood which could certainly be attributed to the medication.

¹ Soc. Biol., December 24, 1910.

² American Therapeutic Society, May 11, 1911.

³ Society of Medicine of London, xxxiii.

⁴ Medical Record, September 9, 1911.

DIAGNOSIS OF THE TYPE OF ACUTE LEUKEMIA. The whole subject of the acute forms of leukemia has attracted great interest for the last few years, and no point in connection with it has received as much attention as the differential diagnosis between the two forms, the lymphoid and the myeloid. This diagnosis is made difficult by the great similarity of the cells found in the blood in the two conditions, and in fact some authors do not admit two distinct forms. By the investigators who do believe in the existence of both a myeloid and lymphoid type of acute leukemia, and in there being a difference between the young, ungranulated forms belonging to those two systems, there has been a series of arguments and evidences brought forward in favor of their view, including morphological, chemical, biological and functional differences, as well as the results of embryological and histological studies. In view of the mass of material published on this point and the divergent views held by prominent hematologists, it has seemed desirable to state the *status quo* of the question here as briefly as possible. The following résumé is based, to a great extent, upon Herz's¹ admirable monograph on acute leukemia, and individual references will not be given as they may almost all be found in his bibliography.

Morphological Differentiation. It is agreed by everyone that the ungranulated progenitors of the myelocytes closely resemble in appearance the mother cells of the lymphocytes. Even Nägeli, one of the chief upholders of the so-called dualistic doctrine, admits their close similarity, but, in his opinion, certain fine but sure distinctions can be observed. Thus, according to Nägeli, the nucleus of the myeloblast stains heavily with the triacid stain, whereas the nucleus of the large lymphocyte stains poorly and at times not at all. This difference depends upon the varying chromatin content of the nucleus of the two types of cells, and the blue-green nucleus of the large lymphocyte contrasts to the dusty gray-blue of the myeloblast. If, after strong heat fixation, methylene blue stain is used, the cells in question will show pale nuclei with several distinct nucleoli if they are lymphoid in origin, whereas, if myeloid, the nuclei will be dark blue and no nucleoli will be visible. However, the myeloblasts have three or four nucleoli which can best be demonstrated by using pyronin-methyl green staining. Further, according to Nägeli, it is impossible to demonstrate in the myeloblasts the azure granules by means of Giemsa stain as can be done in the large lymphocytes.

Other differences are described by Turk, who sees a distinctive characteristic in the staining of the protoplasm with the triacid stain; the myeloblasts (Turk's lymphoid marrow cells) staining heavily a dirty gray-brown or red-brown color, while the protoplasm of the lymphocytes is almost unstained by this method. In addition, the lymphoid

¹ Die Akute Leukemie, Leipzig and Wien, 1911.

cells have a special tendency to lobulation of the nucleus, which is usually absent in the myeloblasts. According to Turk, these slight differential points are insufficient, however, to surely differentiate the two cell types. Further, Schridde has described, as characteristic of the large lymphocytes, a perinuclear space which is absent in the myeloblasts, and he also claimed to be able to demonstrate, by means of a modified Altmann's stain, the presence of fuchsinophile granules in this perinuclear space of the lymphoid cells, which characteristic is absent in the cells of myeloid derivation.

Many objections have been raised to these various criteria, chiefly by Pappenheim, who states that it is impossible to recognize any cell difference with the usual methods of staining. He believes that only by the use of the panoptic combined May-Giemsa stain can any differential characteristics be noted, and these depend solely on the staining and arrangement of the chromatin of the nuclei and the nucleoli, and can only be observed with clearness in typical cells of the two types. He also denies any difference in the reaction of the protoplasm of the two types, and he will not admit any difference in the width of the protoplasmatic area, a point which has been much emphasized by many authors. He considers that there are cells with narrow and also broad protoplasm derived from both lymphoid and myeloid tissue, and he considers that the width of the protoplasm depends simply upon the age of the cell; the narrower the protoplasm, the younger the cell.

Butterfield has carefully investigated the count of the nucleoli, which Nägeli has described as a differential point. He studied the ungranulated progenitors of the myelocytes in acute leukemia, and came to the conclusion that the count of the nucleoli depends upon the biological condition of the cell, and this cannot be used as a criterion of their derivation. Further, he emphasizes that the lymphoblasts in the germinal centres of the lymphatic organs may possess anywhere from one to five nucleoli. He also refers to Heidenhain's findings concerning the variability of the nucleolar number. Pappenheim also sees in the nucleolar count no differential point, since no one can distinguish a myeloblast with accidentally few nucleoli from a lymphoblast. Despite these objections, Nägeli believes firmly in the practical worth of the nucleoli count and considers also the appearance of the nucleoli as important, the lymphocytes having relatively large nucleoli with a very thick, well-marked, marginal layer which he does not find present in myeloid elements.

A further controversy concerns the azure granules, which, according to Nägeli, are found only in the lymphocytes. They are considered by their discoverers, Michaelis and Wolff, and also by Pappenheim and Turk, not as true granulations but as secretion products of the cell, which in the same cells, might at one time be found and at another be absent. Further, Hynek has described similar granules in myelo-

blasts which he considers to be the predecessors of the neutrophilic granules. The granules which Pappenheim describes in myeloblasts, and which he believes to be identical with those described by Nägeli in the lymphoblasts, Nägeli considers to be unripe neutrophilic granulations. The perinuclear space which Schridde mentions as characteristic of the lymphocytes, Pappenheim claims to have seen in Schridde's own picture of myeloblasts, and Butterfield describes in myeloblasts a clearer space around the nucleus or lying to one side of it. Nor will Pappenheim admit Schridde's other differential point of fuchsinophile granules in the perinuclear space of the lymphocytes. According to Maximow, Altmann's granules may occur in any cell, but their occurrence in myeloblasts has been especially emphasized by Butterfield, Heinecke, E. Meyer, and St. Klein. On the contrary, Morawitz and Rehn uphold Schridde's opinion.

Herz expresses the opinion that the only differential point that to him appears sure is the different reaction of the nucleus to the triacid stain in the two types of cell. He does not think that the count of the nucleoli should be considered, since he has repeatedly seen myeloblasts with varying numbers of nucleoli in the same blood preparation, and to explain this, according to Nägeli, it would be necessary for cells of both types to be present. He states that he has observed azure granules in cells which he was certain were myeloblasts, and, further, for the decision as to whether one is dealing, in such cases, with true azure granules or with neutrophilic granulations, it seems of importance to him to observe the arrangement of the granules as has been described by Butterfield, according to whom the azure granules lie singly, often widely separated, and never more than five to a cell, whereas the young, neutrophilic granulations are more equal in size, stain less brilliantly red and are seen in groups of five or more.

It takes but a brief glance at the above quoted contradictory statements concerning the possibility of differentiating these two cell groups by their morphological characteristics to realize that the matter is far from clear, and, indeed, most hematologists admit that it is today impossible, in many cases of acute leukemia, to determine by the appearance and staining reactions of the cells whether they have arisen from myeloid or lymphoid tissue. In fact, the occurrence of transition forms between the ungranulated myeloblasts and the neutrophilic myelocyte is the only morphological basis without objection for the diagnosis of such cells as myeloblasts. Such typical transition forms are never shown by lymphoblasts, either in blood preparations or in lymphatic growths.

Chemical Differentiation. An attempt has been made to make use of certain chemical reactions for the recognition of the nature of the ungranulated cells of the myeloid and lymphoid series. These reactions have for their purpose the proof of the presence of certain ferments in

the cells of the myeloid groups which are supposed not to be present in the cells derived from lymphoid tissue. Thus, as E. Meyer proved, the *guaiac reaction*, used by Brandenburg, results from the action of an oxidizing ferment. This ferment, which is extractable by water and becomes liberated or activated by lysis of the leukocytes, causes the oxidation of the guaiac stain to a deep blue color. This reaction occurs, according to Brandenburg and Mayer, only in cells of the granulated series or in tissues rich in such cells, such as the bone marrow, but never in lymphocytes or other tissue cells, such as the cells of the lymph glands, spleen, thymus, liver, or kidney. Pappenheim, however, claims that other splenocytes and lympholeukocytes also give the reaction. On the other hand, Nägeli has obtained, in a few cases of acute myeloid leukemia, a negative reaction which he explains as due to a varying ferment content of the cells and to the excessive cell production in acute leukemias on account of which the functional qualities of the cells are not fully developed.

The discovery of traces of albumoses in the leukocytes of myeloid leukemia led Müller and Jochmann to the conclusion that a tryptic ferment was present in such blood, and they described a test to prove the presence of proteolytic ferment in the granulated leukocytes and in the cells of the myeloid leukemias. For this, they made use of the Löffler serum-plate on which, with a platinum needle, a drop of blood is placed and the plate incubated. There is formed, with the blood of myeloid leukemia, a della, which, if lymphatic leukemia blood is used, is absent. With this same method Jochmann and Ziegler found the same relation between the organs of lymphatic and myeloid leukemias. They conclude: "We find in our investigations a proof of the correctness of the teaching that the cells of the myeloid series are carriers of a certain ferment power which is absent in the lymphatic series." Müller, after investigation, claims that the large lymphocyte of Ehrlich, on account of its containing proteolytic ferment, should be counted not as a lymphocyte, but with the myeloid cells. The presence of a proteolytic ferment in the leukocytes of myeloid leukemia has also been demonstrated by Eppenstein and Stern, who used weakly alkaline gelatin instead of the Löffler serum. On the other hand, Hirschfeld reports a case of myeloid leukemia which underwent transition into a myeloblastic form, and in which the proteolytic ferment was lacking. The results obtained by Morris and Boggs, whose investigations were limited to neutral media, are also opposed in part to the more generally accepted opinion. Their conclusions are: "(1) A protease is present in the lymphocytes of chronic lymphoid leukemia, and in the leukocytes of acute and chronic myeloid leukemia and of pus. (2) Lipase occurs in the white cells in the same conditions. (3) It is shown that amylase is contained in the granular leukocytes of pus and of myeloid leukemia, acute and chronic, and in the lymphocytes of chronic lymphoid

leukemia. (4) Maltase is likewise a product or constituent of these cells. (5) Digestion of saccharose, lactose, and glucose by myeloid or lymphoid cells has not been observed in neutral media. (6) Oxidase is demonstrable in the leukocytes in conditions in which the granular cells of the marrow are present in large numbers. (7) Biological differences between myeloid cells and the lymphocytes of chronic lymphoid leukemia have not been demonstrated in neutral media. (8) It is a legitimate inference that in part, at least, the enzymes of the plasma may be derived from the leukocytes."

Finally, W. Schuitze has applied the oxydase reaction of Winkler, the indophenolblue synthesis, for the proof of the presence of oxydase in granulocytes. The description of this method has been given in this article last year and the year before. The exact technique continues to be discussed, some using the two solutions one after the other, whereas some use a mixture of equal parts; also, the advisability of using the solutions fresh is in doubt. Confirmatory opinions concerning the value of this method are given by R. Schmidt, Peters, Dunn, Bingel and Betke; Morris and Boggs, already quoted, report a negative result in a case of acute myeloid leukemia, and Klieneberger was not able to demonstrate the reaction in a case of chronic myeloid leukemia which terminated as a myeloblastic leukemia. Jagic was at first opposed to this reaction, but, in a later publication with Neukirch, he recognizes its importance and sees a sign of degeneration in its absence in the ungranulated mononuclear leukocyte forms seen in a case similar to Klieneberger's. He blames the loss of the oxydase reaction to a functional injury of the granulocytes by the Röntgen rays. Herz speaks in favor of the value of the reaction, especially when dealing with tissues, but he has observed, in a case of chronic lymphatic leukemia, the blue granules in the large lymphocytes. This, he states, may have been due to an error in the technique.

The further evidence of functional differences, and the results of embryological and histological studies, being of less practical interest, will not be mentioned here, but it may be stated that as yet no satisfactory conclusions can be drawn, and it must be admitted that the whole question is still undecided.

Leukanemia. This term, which most certainly should be discarded, still appears occasionally in the literature in connection with cases of varying nature, no one of which does it but poorly describe. In this article in *PROGRESSIVE MEDICINE* in 1908 and 1910, brief mention was made of this subject and cases to which the term had been applied were abstracted. This year there have been fewer reports, and but two of the reports are of interest. Dr. W. J. Hamilton reported, at the meeting of the Association of American Physicians, in May, 1911, a case of a farmer, aged forty-three years, who, while in good health, noticed a mass below the left costal border. This mass increased in size, and he

lost appetite, weight, and strength, and grew pale. Upon examination, the mass was found to be the spleen which extended down to Poupart's ligament; the liver was found to be slightly enlarged. There was no ascites or glandular enlargement. The blood examination showed hemoglobin 65 per cent.; red corpuscles, 3,150,000 per c.mm.; leukocytes, 5600 per c.mm. Stained specimens showed that the polymorphonuclear forms were diminished, while the lymphocytes and large mononuclear cells were greatly increased. Myelocytes were present in small numbers. Death occurred about two and a half years after the onset. No autopsy was made. This case Hamilton states was really one of atypical leukemia and he agrees that the term leukanemia might well be discarded. The other case was reported by Alsleben¹ under the title, "A Case of Leukanemia," and occurred in a woman, aged twenty-nine years, who presented the symptoms of palor, weakness, fever, and hemorrhages. Upon examination, a much enlarged liver and spleen were found. The blood examination showed red corpuscles, 800,000 per c.mm.; white corpuscles, 71,000 per c.mm. Differential count: Polymorphonuclears, 29 per cent.; eosinophiles, 1.8 per cent.; lymphocytes, 7.2 per cent.; transitionals, 1 per cent.; neutrophilic myelocytes, 36 per cent.; eosinophilic myelocytes, 1.7 per cent.; myeloblasts, 23 per cent. While counting 1000 white cells, 332 nucleated reds were seen, of which the majority were megaloblasts. The case ran a rapid course and terminated fatally in two months. Autopsy showed marked myeloid infiltration of the spleen and liver; the bone marrow was red and evidenced active myeloblastic and erythroblastic processes. The author concludes that although myeloid reactions occur in severe anemias and *vice versa*, yet, in this case, the association of the two processes was primary. There seems to be very little need or excuse for using the term leukanemia in connection with this case.

Hodgkin's Disease. *Symptomatology.* Most of the literature of the last year concerning Hodgkin's disease has been of little significance, and no new knowledge on this subject has been added to our too meagre store. However, a very thorough and interesting monograph has recently appeared by Kurt Ziegler,² in which the author covers the entire subject carefully from its various aspects. The author quotes freely from a long series of cases and the many references to individual cases add to the readableness of the book. For anyone desiring to acquaint themselves with this subject, especially from the clinical point of view, Ziegler's work may be heartily recommended.

Ziegler gives some interesting figures, in his chapter on general symptomatology, concerning the relative frequency of the various locations of the primary glandular enlargement. He adopts the well-known

¹ Zeit. f. klin. Med., Band lxxi, Hefte 5 and 6.

² Die Hodgkinsche Krankheit., Fischer, Jena, 1911.

division of the disease into two stages: the first, the local lymph-gland swelling, and the second, the general disturbances. These two stages are those spoken of by Trusseau as the latent and progressive periods respectively.

The first, local or latent period, is characterized chiefly by the enlargement of the glands of a single group, and the symptoms occasioned mechanically by such enlargement. In the series of 120 cases, the author finds that the primary enlargement in 50 per cent. occurred in the glands in front or behind the sternocleidomastoid muscle on one side of the neck; very rarely on both sides simultaneously. In 10 per cent., the axillary glands of one side were the first affected, and, in 6 per cent., the supraclavicular glands. The mediastinal, inguinal, and posterior cervical glands were each the primary site of enlargement in 3 per cent. of the cases. On the other hand, in 9 per cent., the spleen was observed to be enlarged before there was any glandular change appreciable, and in 12 per cent. of the cases, no peripheral glandular swellings appeared. Very rarely the retroperitoneal, salivary, or lacrymal glands were primarily involved. The author states that this latent period may continue from a few weeks up to fifteen years.

The second stage of propagation and generalization is sometimes brought on by some acute infection, such as influenza, and usually is ushered in by further enlargement of the previously enlarged glands, or, less frequently, the appearance of new groups. The symptomatology of this stage is too well-known to require more than a mention of its great variability, any or all systems or organs being at times affected.

Pernicious Anemia. No great advancement seems to have been shown in the work of the last year on the subject of pernicious anemia. The questions of etiology and treatment are attracting most attention at the hands of the investigators, and will be especially considered in this review.

Ellermann¹ suggests the possible *infectious origin of pernicious anemia*. He discusses the typical marrow changes in the long bones, myeloid changes in the spleen and liver, the gastritis, and the fatty degeneration and siderosis. No one change can be said to be characteristic of pernicious anemia and all of them may develop as the result of some toxic action. The morbid anatomy of pernicious anemia and that of myeloid leukemia are strikingly similar, as are also the remissions which occur in both. Irregular fever is common to both, and the prognosis is equally grave for each. His research on fowl leukemia has shown still further resemblance between the two, and has demonstrated that leukemic changes in the blood are not the essential feature of the disease, as they were often lacking in the early stages and sometimes disappeared during the course of the disease. In certain other instances

¹ Ugeskrift for Læger, October 12, 1911, lxxiii, No. 41.

they never developed at all, although the marrow, liver, and spleen showed the characteristic changes. In other cases, there was merely intense anemia and changes in the bone-marrow. He has encountered also in the clinic these same three forms: namely, the true leukemic, the pseudoleukemic, and the anemic. The last-mentioned form has so many points in common with pernicious anemia that he is inclined to regard the latter as the extreme type of the former. Arnsperger has reported an epidemic of 5 cases of myeloid leukemia in a small district, and 5 others which resembled it clinically, but in which no blood examination was made. Vie has reported 2 cases of myeloid leukemia in a family; and Weil and Gilbert have reported pernicious anemia in two brothers, and the child of one; and Patek, 5 cases in one family.

The general conclusion in Ellermann's research is that, as an infectious origin is now accepted as possible for myeloid leukemia, the same etiology may be accepted for progressive pernicious anemia. This assumption would explain the latent phases, as in malaria and syphilis; also that the only possible efficient drug seems to be the parasiticide arsenic, the ineffectiveness of which at times being explained by the fact that the parasites become arsenic proof, as is the case in trypanosomiasis. That anemia can be an infectious syndrome is shown by Carr's and Valle's report in regard to a filterable virus as the cause of anemia in horses, and that of Trineas for the anemia of dogs; while Ellermann's own research came to the same conclusion in regard to fowl leukemia.

Patek's¹ report of 5 cases of well-authenticated pernicious anemia in one family also suggests an infectious origin for the disease. Two of the cases, brother and sister, were typical cases of the ordinary plastic type of the disease. The third case, a brother, presented unusual features in that the blood picture was of the aplastic type, and the anemia was largely overshadowed by severe nervous symptoms. These indicated a spastic paraplegia with marked incoördination. The fourth case was a cousin on the paternal side of the 3 cases noted above, and the fifth case was the paternal uncle of all 4 cases. Two other cases, sisters of the first three cases, suffered from well-marked, anemic attacks, but the blood findings and the history indicated secondary anemia, and they were perfectly well at the time the report was made.

Patek draws the following conclusions:

"1. The clinical history and blood findings permit of no doubt that 5 of these patients (two brothers and a sister, a paternal cousin, and a paternal uncle) suffered from primary pernicious anemia.

"2. The weight of evidence which the 2 cases of secondary anemia add is not to be wholly ignored, because anemia of the secondary type has frequently been known to be a precursor of the primary form.

¹ Journal of American Medical Association, May 6, 1911, lvi.

"3. Hunter's theory, so strongly defended by him, that septic conditions in the mouth—stomatitis, glossitis, etc.—are the etiological factors in this disease, sheds no light on this series of family anemias. (No such mouth condition existed in any of the cases.)

"4. The possibility, here shown, of its being a family disease and the knowledge that the disease is on the increase—not only relative, but absolute—suggest an as yet unrecognized source of hemolysis that is showing increased general activity and is uninfluenced by environment or station."

The possibility of a *protozoal infection as the cause of pernicious anemia* deserves consideration, according to Moffitt,¹ because of the following facts:

1. Anemia—a prominent feature of many diseases of known protozoal origin.
2. Fever—as in trypanosomiasis.
3. Remissions—common to many.
4. Nervous symptoms, as in syphilis and trypanosomiasis.
5. An increase in lipoid substances, as in syphilis and trypanosomiasis.
6. The value of arsenic.

Atrophy of the gastro-intestinal glands has been advanced by some authors as an etiological factor in pernicious anemia, and this has received apparent support by the value attributed to strong and dilute hydrochloric acid as remedial agents. Austin,² however, agrees with A. Schmidt that atrophy of gastro-intestinal glands does not cause pernicious anemia, nor does pernicious anemia cause any characteristic changes in the gastro-intestinal mucous membrane.

In an effort to tabulate the existing views on pernicious anemia, Pappenheim³ states the following:

1. Pernicious anemia is an especial disease (Biermer, Nägeli); it is a primary myelopathy, or disease of the bone marrow (Cohnheim, Ehrlich); it is idiopathic (Bloch, Helly). Since it is not the result of a cause or the symptom of another disease, it is a primary, essential, idiopathic entity. The pathological findings are the groundwork of the disease, and the blood picture is the result of the process.

According to this view, tape-worm anemia is an exception; because, although the blood findings are identical, a known cause exists.

2. Pernicious anemia is a simple secondary anemia and a secondary myelopathy of cryptogenic origin, only lately distinguished from other secondary anemias (Birch-Hirschfeld, Neumann, Litten, Grawitz).

Opposed to what he calls these two extremes is his own view: Pernicious anemia is not an actual disease, but a hematologic picture, which can be brought about by various causes, or without demonstrable

¹ American Journal of the Medical Sciences, October, 1911, cxlii.

² Boston Medical and Surgical Journal, July 27, 1911.

³ Folia Hematologica, December, 1910.

cause; as in Biermer's disease. It accompanies *Bothriocephalus latus* infection, forms the anemic component of leukanemia, and may be produced by the hemotoxins of carcinoma and Banti's disease. It is always secondarily myelopathic; and this bone marrow disturbance may be a benign functional regenerative process, or it may be a toxic one, affecting the erythroregenerative action. All anemias, therefore, are secondary myelopathies. The simple secondary anemia exhibits this as a benign functional blood regeneration; the pernicious secondary anemia, as a toxic erythroregenerative process, due to a known or an unknown poison. The megaloblastic outpouring is not an expression of *primary megaloblastic degeneration*, in which the bone marrow suddenly begins to functionate in a pernicious manner; but a *secondary megaloblastic regeneration*.

He thinks, therefore, that there is no such thing as an idiopathic anemic myelopathy. Biermer's anemia, which is a form of secondary pernicious anemia, is brought on by a primary hemo-intoxication or a myelo-intoxication of unknown origin. Following this, there is produced, respectively, a myelopathy or a hemolysis; and, as an end result, the anemic regeneration appears. This may be represented graphically as follows:

$$\text{Poison} \left\{ \begin{array}{l} \text{hemolysis—myelopathy} \\ \text{myelopathy—hemolysis} \end{array} \right\} \text{anemic regeneration.}$$

Biermer's anemia differs from the other forms of secondary pernicious anemia only in the fact that, in the former, no cause can be found for the symptoms. That one is justified in asserting that such a cause does exist, seems to Pappenheim to admit of no doubt.

The aplastic form may be either of the simple or pernicious variety. It does not depend on a primary idiopathic functional aplasia of the bone-marrow any more than the other forms of secondary anemia. The siderosis proves that a precedent hemolysis has taken place, and this implies the presence of a hemotoxin. Hemolysis and blood degeneration are present without evidence of regeneration.

These two forms of secondary anemia, the simple and the pernicious, are distinguished chiefly by means of the blood findings. The term "pernicious," even in the curable tape-worm anemia, refers to the characteristic blood picture; and, hence, is only symptomatic. In the case of *simple* secondary anemia, the *normal* bone marrow is stimulated in a regenerative way; in *pernicious* secondary anemia, a *toxic* bone marrow receives the regenerative stimulation.

Aplastic Pernicious Anemia. Stitt¹ reports a case of the aplastic variety of the disease, associated with anchylostomiasis, in a Filipino youth, aged twenty years. Examination of the stool showed tricho-

¹ United States Naval Medical Bulletin, July, 1911, v, 345, No. 3.

cephalus and uncinaria ova. Amebæ were also present. Blood examination showed a leukocyte count of 4600, with a differential count of 50 per cent. polymorphonuclears, 34 per cent. small lymphocytes, 9 per cent. large lymphocytes, 3 per cent. large mononuclears, 4 per cent. eosinophiles. Hemoglobin was 40 per cent. No abnormal red cells were found, and no parasites. Possibly a slight anisocytosis was present. The sputum and the tuberculin test were both negative, as was also the Wassermann reaction. Thymol treatment was given, and twenty-four worms (*Necator americanus*) were obtained. From this time on, stool examinations were negative for hook-worm ova. Later, the patient developed a temperature of 103°, and complained of impairment of vision. Ophthalmologic examination showed haziness of the disk, and retinal hemorrhages of venous origin. Blood examination showed leukocytes, 3200, with 35 per cent. polymorphonuclears, 34 per cent. small lymphocytes, 27 per cent. large lymphocytes, 3 per cent. large mononuclears, 1 per cent. eosinophiles. No nucleated red cells, and no poikilocytosis. Erythrocytes numbered 1,570,000 and the hemoglobin was 30 per cent., giving a blood index of 0.9. The blood examination made on the day of his death, a month later, during which time the temperature had been normal, showed 490,000 red cells and 10 per cent. of hemoglobin. No normoblasts or megaloblasts were found in a prolonged search. At autopsy, the intestines showed some areas of hemorrhage, and the bone marrow was scanty, pinkish, and quite fatty. Stained smears of the marrow showed small numbers of lymphocytes and red cells, but no nucleated reds or granular leukocytes.

In discussing his case of aplastic pernicious anemia, Larrabee¹ describes the essential characteristics of the three well-known types of anemia as follows:

1. *Orthoplastic anemias* are those secondary to definite morbid states, such as infections, neoplasms, parasites, chronic intoxications, chlorosis, and anemias from hemorrhages and poor nutrition. The hemoglobin is lower than the red cells (a low color index). Qualitative changes are slight. The marrow is red, but it is what might be termed a normal red marrow with a preponderance of normoblasts and neutrophilic myelocytes. There is a compensatory hyperplasia of the bone-marrow.

2. *Metaplastic Anemias*. This form includes progressive pernicious anemia, that due to the *Bothriocephalus latus* and rarely that of syphilis, liver cirrhosis, and metaplastic changes of benign forms. The color index is high. The red cells show also qualitative changes in form and coloring. Megaloblasts are in excess of normoblasts. The yellow marrow is replaced by red cellular marrow, in which there is also an excess of megaloblasts.

¹ American Journal of the Medical Sciences, July, 1911.

3. *Aplastic Anemia*. This is due to a failure of reparative processes. There is a low red cell and hemoglobin count, and usually a low color index. Slight qualitative changes in form and coloring are seen. Nucleated reds are practically absent. The granular leukocytes are much decreased. The marrow varies in color; usually yellow and fatty, but sometimes red and cellular. Erythroblasts, myelocytes, and blood corpuscle-forming cells are missing from smears made of the marrow. When red and cellular, the cells are usually lymphocytes. The lymphoid tissue, judging from clinical and experimental evidence, may be either the cause or effect of the marrow destruction.

His case of aplastic anemia, he believes to be the only one so far published in which a remission has been observed after the aplastic condition was definitely recognized.

Association of Pernicious Anemia with Other Diseases. Labbé and Lavastine¹ report a case of chronic purpura and hemophilia, which presented also signs of pernicious anemia. They comment on the fact that the so-called blood diseases are rather syndromes due to histochemical changes in the blood, resulting from a variety of causes. The clinical evolution of this case and another of chronic purpura and hemophilia without signs of pernicious anemia show that the three syndromes were not interdependent, but merely casually associated. Under serotherapy, the tendency to hemophilia was arrested in both patients; the first patient recovered, but the pernicious anemia continued to a fatal termination.

Vanderhoof² reports a case of jaundice associated with weakness. There were no abdominal symptoms or evidence of obstructive lesion of the bile ducts. The blood picture was typical of Addison's anemia. Improvement resulted under arsenic and proper hygiene.

Treatment. Tieche³ reports a case of severe anemia in which he excluded *Bothriocephalus latus*, *Anchylostoma duodenale*, and carcinoma. Blood examination showed hemoglobin 12 per cent., red cells 635,000, white cells 3230, poikilocytes, macrocytes, and a few megaloblasts. He feels constrained to call the case one of primary progressive pernicious anemia, although he admits that the diagnosis might be questioned. At Davos, at an altitude of 1500 meters (circa 4800 feet), under arsenic medication, she failed rapidly and became almost moribund. An injection of 10 c.c. of blood, taken from a vein in the elbow of an attendant and immediately introduced into the patient's back, produced, in two days, a remarkable change for the better in her condition. In two days more, her hemoglobin had risen to 33 per cent. and the red cells to 4,300,000 with some poikilocytosis and an occasional megaloblast. Two days later, six days after the first injection, a second

¹ Archives des Maladies du Cœur, January, 1911, iv, No. 1.

² Dominion Journal of Medicine and Surgery, April, 1911.

³ Correspondenz-Blatt f. Schweizer Aerzte, January 10, 1911.

injection of the same amount was made and the patient was removed to her home. Six months later her hemoglobin had increased to 75 per cent., her general condition was good, and she was considering resuming her housework.

Bovaird¹ reports the *effect of transfusion in three cases of pernicious anemia*. The first patient was nearly moribund at the time, and recovery was prompt and progressive. Six months later, he returned to the hospital in nearly as bad condition as before. He failed steadily, and it was determined to resort again to transfusion. While search for a donor was being made, the patient began a spontaneous improvement which was still present when the article was written.

The second patient's transfusion had to be stopped on account of faintness in the donor before the operation was considered finished. The following day the patient's temperature rose to 106°, he had dyspnea, swelling of the face and eyelids and an urticarial and hemorrhagic eruption all over the body. It was then discovered that the blood of the patient and of the donor contained malarial parasites. The donor insisted that he had never had malaria. Under quinine, the parasites disappeared. After a short period of improvement, the patient relapsed and died.

In the third case, transfusion was followed by prompt and, up to the time of writing, complete disappearance of the symptoms.

In all cases, the blood of the donor was tested with that of the patient for evidence of hemolysis. Several were rejected for this cause. The blood of the second patient was not hemolysed by that of the donor either before or after transfusion, and yet the patient presented all the symptoms of having undergone an anaphylactic reaction. From this, Bovaird argues that anaphylaxis is produced through the tissues of the body, rather than the blood. He thinks that search of the donor's blood for latent malaria should form part of the routine examination.

Despite Cabot's warning against its use, Bovaird thinks that under proper precautions its use is justified with the idea of prolonging the patient's life by favoring remissions.

For pernicious anemia in pregnancy, Bauereisen² recommends blood injection. He reports 2 cases of pernicious anemia in pregnant women, in which he cured the patients by daily subcutaneous or intramuscular injections of 5 or 10 c.c. of whole blood, seven injections being given in one, and 5 in the other case. He recommends this method for its simplicity, and advises its wide adoption in general practice. The one yielding the blood sits near the patient. As soon as the blood is taken from a vein in the arm, it is injected into the patient when still warm, and the spot slightly massaged. The effect seems to be the same as when large amounts of defibrinated blood are used.

¹ Medical Record, February 11, 1911.

² Zentralblatt f. Gyn., August 19, 1911, No. 33.

Esch¹ reports a case of pernicious anemia developing in the second half of a pregnancy, with a rapid turn for the worse after an unusually favorable delivery. He injected 35 c.c. of defibrinated blood, and three more injections followed in two weeks. The hemoglobin increased from 22 to 53 per cent., and at the end of two months had risen to 75 per cent. The dyspnea and gastric symptoms ceased at once. The injections, five in all, varied in amount from 25 to 70 c.c.

A. Schmidt and David² believe that the favorable results that high altitude have on the blood-producing apparatus is due to the lessened oxygen partial pressure in the lungs. The lower the oxygen pressure, the better its absorption by the lung alveoles. Schmidt has constructed an apparatus which, while it maintains normal atmospheric pressure, contains oxygen in only about 12 per cent. of its normal proportion. He has used it in 20 cases of anemia, and even pernicious anemia has shown marked improvement, as well as chlorosis and a number of respiratory conditions.

A case of progressive anemia in a patient with a history of syphilis four years before, in spite of mercury and iodides, led Muktedir³ to try *glycerin* as a last resort. A tablespoonful was given three times a day, which was later increased up to 70 gm. A slight diarrhea ensued; but except for this, recovery was prompt and steady. A blood count finally showed red cells 4,200,000, white cells 5300, and hemoglobin 100 per cent.

Leede⁴ reports the use of *salvarsan* in a case originally diagnosticated pernicious anemia. Great improvement resulted. Later, proof of syphilis was obtained. Leede believes that the result obtained from an injection of salvarsan could be used in making a differential diagnosis between syphilis and pernicious anemia, although he advises against its use in true pernicious anemia.

Bramwell⁵ reports 2 cases with typical symptoms of pernicious anemia in which distinct and continued improvement has occurred after stopping all other arsenic medication and giving four injections of salvarsan.

Herrick⁶ reports a case of pernicious anemia which was mistaken for amebic ulcerative colitis. The patient had lived in Cuba and Porto Rico for eight years. For the last eight months previous to his arrival in New York, he had had severe attacks of diarrhea which resulted in great emaciation and prostration. Upon examination, the patient was pale, but not lemon-yellow, and had lost in weight in the neighborhood of fifty pounds, or more than 33 per cent. of his original weight. Blood

¹ Deut. med. Woch., October 19, 1911, xxxvii, No. 42.

² Münch. med. Woch., May 2, 1911, lviii, No. 18.

³ Deut. med. Woch., May 18, 1911, xxxvii, No. 20.

⁴ Münch. med. Woch., May 30, 1911, lviii, No. 22.

⁵ British Medical Journal, March 11, 1911.

⁶ Archives of Internal Medicine, December, 1910.

pressure was—systolic 100, diastolic 65. Heart and lungs were normal; liver and spleen not enlarged; abdomen tender, and showed areas of gurgling. Stool showed actively motile amebæ, which were considered amebæ dysenteriae. Blood showed hemoglobin 20 to 14 per cent.; red cells, from 1,300,000 to 700,000; white cells, from 4000 to 2200. Polymorphonuclears were decreased, lymphocytes increased, marked poikilocytosis, anisocytosis and a few normoblasts.

The ipecac treatment, as described by Simon in the *Journal of the American Medical Association*, 1909, liii, 1526, was instituted; but the patient grew steadily worse. Transfusion seemed to be indicated, and was performed from a donor whose blood gave no hemolysis with the patient's. He died the same day, with symptoms suggesting rapid thrombosis of certain of the cerebral arteries.

A partial autopsy showed numerous deposits of hemosiderin in the liver and spleen. The intestines were normal throughout, except a slight hyperplasia of the solitary lymph follicles and a few petechiæ. Bone marrow was pink and showed small hemorrhages, islands of myeloid cells, extensive phagocytosis of red cells, normoblasts and megaloblasts.

The mistake made was in not differentiating the *Entameba coli* and the *Entameba histolytica*. This is exceedingly difficult to do, and the error in diagnosis seems, in this case, excusable.

Anemia in Infants. Finkelstein¹ finds that the presence or absence of pallor in infants is not a reliable sign as to the degree of anemia. Some infants seem to have less than the normal reserve of iron to carry them through the nursing period, during which, if fed on milk exclusively, very little iron is ingested. This chlorotic type of anemia is observed largely by French writers; but in Germany, where a mixed diet is usually begun earlier, it is rarer. It is found, as a rule, in twins, in babies born prematurely, and in the offspring of poorly nourished, anemic, neuropathic mothers. This lack of iron can usually be supplied by administering it as such or in a mixed diet. In certain cases, however, there seems to be a constitutional underdevelopment of the hematopoietic system. Reliance is usually laid on hygienic-dietetic measures, adding a little meat juice, cheese, half an egg, fruit juice, or vegetable soup to the milk. If iron must be given as a drug, the saccharated ferrous carbonate twice a day answers very well. Removal of the cause is the first measure in the secondary forms. His experience with pseudoleukemic anemia in children seems to demonstrate that it is the extreme type of secondary anemia from toxic or infectious causes in children with a congenital debility of the blood-forming organs. The prospect of a cure is good, if the infant be kept in the fresh air and with proper care and diet. Only in the uncomplicated cases, and those in which iron has been given, does arsenic seem to be of advantage.

¹ Berl. klin. Woch., October 9, 1911, xlviii, No. 41.

Ostrovski¹ reviews the clinical picture of splenic anemia as he has seen it in 10 infants between one and three years of age. All had been fed early with cows' milk, and there was a history of diarrhea in all. The children were under weight and pale, and had rachitis to a greater or less extent. The spleen was enlarged, but the liver was practically of normal size and the lymph nodes were not enlarged. He is convinced, from these experiences and a study of the literature, that splenic anemia is a secondary condition, usually following some catarrhal affection of the digestive tract in undernourished children. The changes in the red cells are typical of splenic anemia. In differentiating it from leukemia, the lack of noticeable leukocytosis and of changes in the lymph glands, with the comparatively small proportion of myelocytes in the blood, is striking. The prognosis of splenic anemia is grave, with treatment restricted to iron, arsenic, and the Röntgen rays.

Hemophilia. During the year but few cases of hemophilia have been reported, and the advances in the etiology of the disease have not been very marked. Several good papers, however, have appeared.

Emil Weil,² in a paper on hemophilia, states that:

1. Hemophilia is not so rare in women as we believe.
2. That those women, apparently healthy, who transmit the bleeding diathesis to their male children, are really, from a standpoint of their blood, hemophilic.
3. That there is a difference in the blood changes between true hereditary hemophilia and the sporadic, spontaneous hemophilia.

Weil lays stress on distinguishing these two forms of hemophilia, the accidental or transitory, and the congenital type, and points out their differences.

In the transitory variety he found the blood to be thin, and to flow rapidly through a needle inserted into a vein. The leukocyte count was normal, and the coagulation time approximately seventy-five minutes. The coagulum was solid and the serum copious.

In the congenital type, the blood was sticky, flowed slowly, and showed an increase in the mononuclear leukocytes. The coagulation time was from two to nine hours. The coagulum was soft, and the amount of serum small.

Thatcher³ makes a plea for a better classification of the blood diseases, and, after discussing purpuric conditions of minor interest dependent upon mechanical obstruction, changes in the vessel walls, conditions of general malnutrition and chronic drug poisonings following certain acute infections, etc., dwells at some length upon the two more important groups of hemophilia and idiopathic purpura.

This author says: "In one group, the hemorrhagic tendency is

¹ *Jahrb. f. Kinderheilk.*, June, 1911, lxxiii, No. 6.

² *Bull. et Mém. de la Soc. des Hôp. de Paris*, 1910, 3 S., 300.

³ *New York Medical Record*, April 15, 1911.

strikingly hereditary, and, as a rule, pretty clearly congenital. The clinical picture, moreover, differs from that of the other group, in the great prominence of hemorrhages from the various surfaces and in the much less prominence of other symptoms. The blood also, by certain tests, shows characteristic abnormalities. To this group should be given the exclusive right to the name hemophilia. There are other cases presenting a similar picture without the history of heredity. These may be variants of the same disease and courtesy should, perhaps, allow them the benefit of the doubt and the title, but, for safety's sake, arguments and conclusions regarding hemophilia should at present be based strictly upon the cases which are clearly hereditary.

"The hemorrhagic diseases of the newborn are often spoken of as hemophilia, but they are thought to be of infectious origin, and the name hemophilia for them tends to confusion.

"The remaining group is larger in the number of cases and more varied in its clinical picture. The clinical features which we find presenting in the various combinations by this group of cases are chiefly these:

"Hemorrhagic eruptions, from minute petechiæ to large ecchymoses; the eruptions of erythema multiforme, erythema nodosum and urticaria; localized edema; symptoms of arthritis; crises of abdominal pain, often with vomiting or diarrhea, sometimes leading to a diagnosis of intestinal obstruction and to operation; hemorrhages from the alimentary, the respiratory, or urinary passages; frequently nephritis; rarely endocarditis and pericarditis. This group we may call the idiopathic purpura.

"These symptoms occurring in this group which we call idiopathic purpura do not, of course, all of them occur in every case. Some cases are very mild and present but one or two of the symptoms. In some, the joint symptoms are prominent; in others, the visceral symptoms; and, in others, the hemorrhages. Shall we, therefore, subdivide and further classify the idiopathic purpuras?

"This has been done for us in the following way: The cases in which the symptoms are very slight, with a little beyond petechial eruption, are put by themselves under the title of purpura simplex. Those in which joint symptoms are prominent, are grouped under the name purpura rheumatica, or, better, purpura arthritica. Those with visceral symptoms under the name purpura abdominalis or Hænoch's purpura, and those in which the hemorrhage is the prominent feature as purpura hæmorrhagica.

"For convenience in studying and recording, it may be well to accept this classification, but it should only be done provisionally and with the admission that as yet no definite lines of cleavage appear between these groups.

"In a special group, called purpura fulminans, have been put those few cases which run a very brief, malignant course. They all, or at

least all typical cases, occur in children, are quickly fatal, and rarely last longer than eighteen to forty-eight hours."

PATHOLOGY AND ETIOLOGY. Upon postmortem examination of many of these cases, various findings have been recorded, but regarding any standard anatomical basis, most writers fail to agree. Hemorrhages in the various internal organs are frequently mentioned, notably the submucosa of the stomach and intestines, where also minute areas of necrosis have been observed.

Nephritis has been dwelt upon by various writers, notably Delearde,¹ who draws attention to the frequency of nephritis as a complication in purpura rheumatica, and Houtinel² who writes on the purpuric group in general.

From a study of the microscopic pathology, no constant alteration in the bloodvessels has been found.

Addis³ studied carefully the pathogenesis of hereditary hemophilia using 12 cases as a basis of his investigation. In all, the time of coagulation of the blood was delayed, and the delay was proportional to the severity of the symptoms. This author states that the delay in coagulation is the only pathological finding common to all cases, and he states it is due to the faulty action of hemophilic prothrombin changing into thrombin in the presence of calcium salts and thrombokinase. He also found that varied amounts of calcium added to hemophilic plasma did not shorten the coagulation time, nor did varied amounts of thrombokinase alter it.

From this study, Addis draws the following general conclusions:

1. Fibrinogen is present in as large amount in hemophilic as in normal blood. Hemophilic fibrinogen is as readily coagulated by thrombin as is normal fibrinogen.

2. The amounts of thrombin developed in the complete coagulation with the same quantities of hemophilic and normal blood are equal. Hemophilic thrombin is as active in coagulating fibrinogen as is normal thrombin. The rate of production of hemophilic thrombin is slower than that of normal thrombin. The degree of this retardation in formation is proportional to the degree of delay in the coagulation of the blood. The proximate cause of the delay in coagulation is the slowness of the formation of hemophilic thrombin.

3. There is no appreciable difference in the antithrombin content of hemophilic and of normal bloods.

4. There is no substance in hemophilic blood not present in normal blood which hinders the formation of thrombin.

5. There is no appreciable difference in the amount or activity of the calcium in hemophilic and in normal bloods.

¹ *Echo Méd. du Nord. Lille*, xv.

² *Gaz. des Hôp. de Paris*, 1910, lxxxiii.

³ *Journal of Pathology and Bacteriology*, 1910 to 1911, xv.

6. Hemophilic thrombokinase, derived from the formed elements of the blood or from the tissue cells, is as abundant and as active as is normal thrombokinase.

7. Prothrombin is present in as large amount in hemophilic as in normal blood. There is a defect in hemophilic prothrombin which reveals itself in the longer time it requires for the change into thrombin, in the presence of thrombokinase and calcium. This qualitative defect in the prothrombin is the cause of the delay in the coagulation of hemophilic blood.

Sahli¹ takes issue with Addis and states that the delayed coagulation time in hemophilia is due to the lack of thrombokinase. He showed that traces of normal blood, when added to hemophilic blood, restored the coagulation property. In a later paper, Sahli shows that the difference between normal and hemophilic blood resided in the blood corpuscles. Normal corpuscles, even after careful washing, exerted a strong coagulative effect on hemophilic blood. Sahli's final conclusion is, "that hemophilia is a cellular abnormality, both of the blood corpuscles and the endothelial cells of the vessels."

Most authors, however, still cling to Morawitz's theory of coagulation of the blood, which is essentially this:

Fibrin is formed by the union of fibrinogen and thrombin, the latter being due to the combined presence of thrombokinase, calcium and prothrombin or thrombogen.

Morawitz claims that there is present, in the normal circulating blood, an antithrombin which is essential in keeping the blood fluid.

Thrombin has been recently isolated in pure form by Howell,² who studied its properties. But exactly how thrombin acts on fibrinogen to form fibrin is still doubtful.

Evidence has been brought forward also that the coagulability of the blood is dependent upon the normal functioning of the liver, since injury to, or removal of this organ makes the blood uncoagulable.

Hemorrhagic Diseases of the Newborn. As a result of Welch's³ published reports on this subject, particularly dwelling on the treatment of this condition, an added interest has been taken in the subject, as reflected in the number of reported cases in the current year.

Especially to be commended is the article by Schloss and Commiskey⁴ under the title of "Spontaneous Hemorrhage in the Newborn," who, in addition to reporting 9 cases, have approached the subject in a most scientific manner.

In classifying the subject, these authors make two groups: "The one group comprises the cases in which the hemorrhage appears as an incident during the course of some definite disease, the symptoms of

¹ Deut. Arch. f. klin. Med., 1910, xcix.

² Cf. ref. 10, quoted by Schloss.

³ American Journal of the Medical Sciences, 1910.

⁴ American Journal of Diseases of Children, 1911, vol. i.

which are apparently dependent upon the general pathological process. And the second case in which the hemorrhage dominates the entire clinical picture, the symptoms and the fatal outcome, when such occurs, are directly referable to the loss of blood."

SYMPTOMATOLOGY. The hemorrhage occurs before the tenth day of life, and most commonly on the second and third days. Premonitory symptoms are often, but not always, present. There may be abdominal pain; elevation of temperature is often present but of no constant type. Vomiting and diarrhea may occur. The occurrence and extent of the bleeding is variable. There may be multiple external hemorrhages, often associated with internal hemorrhages varying from mild to massive.

The only feature common to all cases is the loss of blood and the resulting anemia.

The frequency of this disease varies within wide limits.

ETIOLOGY. A number of bacteria have been put forward by various investigators as the specific causative factor, but the results of various observers have differed so constantly, that no one specific organism can be made to shoulder the burden. Clinical evidence, however, frequently points strongly to a bacterial causation.

Congenital syphilis has been claimed by many writers to be an etiological factor, and Schloss, after reviewing the evidence, agrees that it may be a predisposing cause of hemorrhage. He does not think so well, however, of the possibility of cerebral injury being a frequent cause of gastro-enteric hemorrhage with the newborn. Many writers have cited certain local causes which have been productive of hemorrhage in infants, notably ulcers of the stomach and duodenum, as pointing toward blood or vascular changes. Schloss states that, in cases of hemorrhage in the newborn, the blood may remain fluid many hours after death.

Schwartz and Ottenburg¹ believe, from their experiments, that impaired coagulability is due to the destruction of, or to interference with the production of thrombokinase.

Schloss, from a series of observations, asserts that absence or delayed onset of coagulation is not constant in hemorrhagic conditions with the newborn and says that it is quite possible that the incomplete, instead of delayed, coagulation is an underlying cause of hemorrhage in some cases of continued bleeding.

Duke² attributes the absence of normal retraction of the blood clot, even although coagulation time may be normal, to be due to the lack of blood platelets.

And summing up the etiology, Schloss concludes as follows:

"It is unquestionable that there is a clinical type of spontaneous

¹ Cf. ref. 10, quoted by Schloss.

² Journal of American Medical Association, 1910, 1185.

hemorrhage in newborn infants, for which no definite etiological agent has been established. From the evidence available at present, it seems very rational to suppose that the spontaneous hemorrhage is directly dependent on some biochemical blood defect or change. But whether the abnormality of the blood or vessels is primarily the etiological factor, or whether the hemorrhage is always secondary to some infectious disease, can only be determined by future investigations."

The mortality in melena neonatorum varies from 35 to 87 per cent., although the adoption of the more recent methods of treatment (to be discussed later) will doubtless lessen this considerably.

Among the fatal cases of melena neonatorum reported during the year are those of Royston,¹ Lord,² and Mills.³

Rheumatic Purpura or Peliosis Rheumatica. Reginald Miller⁴ objects to the view held by many that peliosis rheumatica is usually a manifestation of rheumatism, for two reasons: "In the first place, from all we know of rheumatic infection, its hemorrhagic lesions tend to occur in the most severe examples of the disease, while in peliosis rheumatica such symptoms as are most suggestive of rheumatism suggest, as a rule, only a mild form of the disease—for example, sore throat and muscular pains without serious arthritis, carditis, or chorea. Secondly, one may see a very large number of cases of definite rheumatism with joint, cardiac, and nervous symptoms without meeting an example of peliosis rheumatica among them. For these reasons, there seems to be no theoretical likelihood of peliosis rheumatica being, under ordinary circumstances, or usually, a rheumatic manifestation.

"That peliosis rheumatica is never of rheumatic origin is hardly capable of proof. Nevertheless, it is noteworthy that although both it and acute rheumatism are common enough conditions, yet the occurrence of peliosis rheumatica in a rheumatic subject, especially during an attack of acute rheumatism, is quite uncommon, as Dr. Poynton's paper suggests. It would appear, therefore, more reasonable to explain such instances as the result of a dual infection than as rare or atypical examples of true rheumatism.

"Taking the view that peliosis rheumatica is due to an infection distinct from, although occasionally co-existent with, the rheumatic infection, it becomes, as regards its relationship to rheumatism, analogous to erythema nodosum, which Dr. Poynton refuses to include among the rheumatic manifestations."

F. G. Poynton,⁵ when questioned by Reginald Miller regarding his teaching views on the subject, states: "when I see a case with no clear evidence of rheumatism, I point it out as a condition in which I strongly suspect the future development of rheumatism, but one in which I am not prepared to say is an evidence of the actual disease. Should

¹ British Medical Journal, 1911, I, 810.

² Ibid., 83.

³ Ibid., 993.

⁴ Ibid., 331.

⁵ Ibid., 399.

it occur with obvious rheumatism, I look upon it at present as a rheumatic symptom. This is perhaps illogical, yet the occurrence of purpura is a result of so many diseases that it hardly seems possible to me at present to claim that peliosis rheumatica is not sometimes, and possibly often, rheumatic. The etiology of rheumatism is still in a very unsatisfactory condition . . . but it is in the main the result of a special streptococcal group of infection."

James Metcalfe,¹ exemplifying the difference in type of rheumatic purpura and peliosis rheumatica, reports 2 cases. The first was that of a young man, aged twenty-two years, who had contracted rheumatism after getting extremely wet. He had acute pains in the arms and legs, the ankle and knee-joints being especially affected. He had been in this condition for over a week when the typical patches began to appear on his legs. Each day some fresh maculæ appeared, gradually involving the thighs, abdomen, chest, and back of the hands. Successive crops came out; maculæ in all stages of coloration were to be seen. He was treated with salicylates and alkalies, and, in the later stages, with iron and arsenic, and recovered.

The second case was that of a lady, aged twenty-seven years, in apparently excellent health, with no rheumatic history, who was alarmed one morning by noticing a crop of red spots come out on the dorsum of her feet and the fronts of her legs. Within a day or two she began to suffer with acute articular pain in the toe-joints, ankles, and knees, with edema, which was especially marked over the dorsum of her feet. Large, irregular, purple patches formed from the coalescence of the smaller spots, and in some cases bullæ, containing a yellow serum, formed. She was also treated by salicylates, rest in bed, and afterward with arsenic. In four or five weeks, the blotches gradually disappeared.

In both these cases, the temperature was never high; in the young man 100° F., and in the young lady 101° F.

"The impression I gained from the consideration of these cases was that, in the first case quoted, the infection was a rheumatic one and the purpura an incident. The second case appeared as if it was due to some specific infection and the arthritic pains its sequelæ.

These inferences seem to bear out Dr. Poynton's conclusions.

Henoch's Purpura. McMillan² reports a case of Henoch's purpura occurring in a girl, aged sixteen years, who had violent cramps in her bowels and was vomiting. Knees and ankle-joints were swollen and tender. Three days later severe abdominal paroxysms developed, and the pain was referred to the umbilical region. Her legs were greatly swollen and were covered with purpuric spots, and there were a few isolated spots on the back. Her knee and ankle-joints were very tender, but there were no extensive signs of inflammation. The vomited

¹ British Medical Journal, 1911, I, 525.

² Ibid., 1910, ii, 1718.

matter contained no blood. Temperature 100° F. Two days later diarrhea occurred, and frequent and copious epistaxis. Menstruation, which had been absent for about six months, started again. She improved until the end of the third week, when her symptoms all returned again. Very acute abdominal paroxysms and a fresh crop of purpuric spots appeared. There was blood in the vomitus, and the bowel movements were dark in color. In a month she had recovered and was allowed to walk a few yards when she had a recurrence of the attack with all the former symptoms. She was then placed upon calcium lactate, grains 5, three times a day, alternating with iron and strychnine mixture.

Thereafter her improvement continued, and she has never had any return of symptoms.

The points of interest in this case are that there should be such definite symptoms of rheumatic attack, or, rather, one should say of an arthritic purpura.

Secondly, the severity of the abdominal symptoms which almost brought the patient to the operating table for a laparotomy.

Third, the rapid recurrence of attacks.

Fourth, one must add the fact that there were no recurrences after the administration of calcium lactate.

A case similar to this, but not so severe, was reported by Manson,¹ in which an associated nephritis was in evidence.

Wynter² reports 2 cases of Henoch's purpura, 1 in a child, aged eleven years, with a negative past history, with the exception of rheumatism at the age of four years. The symptoms began with pain in the abdomen for one week, followed by pain, swelling, and stiffness in the left wrist, and purpuric spots on the legs. Vomiting of blood later occurred and, shortly after, an intestinal hemorrhage. Three weeks later a fresh crop of purpuric spots appeared, to be followed two weeks later by still another crop. Later, blood and albumin appeared in the urine, but no tube casts could be found.

The second case was a child, aged thirteen years, with a history of a similar illness two years before. Five days before admission pain was felt in the legs, and purpuric spots appeared. Several days later the patient vomited and developed abdominal pain. The spleen was enlarged. The symptoms subsided, and the patient was allowed to get up. Ten days later fresh purpuric eruption developed, with blood and albumin in the urine and blood casts but no epithelial casts. No edema of the ankles. Two weeks later intestinal hemorrhage. Blood examination showed 19,000 leukocytes and 4,800,000 red blood cells; 65 per cent. hemoglobin. Matthew and Carpenter³ report a case of purpura

¹ British Medical Journal, 1910, ii, 2027.

² Royal Society of Medicine, Clinical Section, iv, 948.

³ American Journal Medical Sciences, 1911, cxlii.

hæmorrhagica occurring in a man, aged thirty-five years, suffering with dementia præcox. It began with nausea and vomiting, which continued for three days, when a profuse intestinal hemorrhage occurred followed by further vomiting, the vomitus now containing decomposed blood.

During the following two weeks there was rapid loss of strength and great emaciation, due to frequent and profuse hemorrhage from the bowels and stomach. Temperature was never over 100° F.

Fifteen days after the onset, purpuric spots began to appear over the elbow and knee-joints, increasing daily in number and finally a few on the trunk. This suggested the diagnosis to the reporters, and the patient was placed on calcium chloride, 20 minims three times a day for four days, with immediate improvement, followed later with calcium lactate for a week, with final gradual convalescence.

The blood picture showed a reduction of blood platelets to 18,700; red blood corpuscles 3,300,000, and white blood corpuscles 7300.

Two cases of purpura are reported by Thatcher,¹ one of which was particularly striking. The patient had had previous attacks of arthritis, followed by gingivitis and by purpuric spots on the hands and fingers. She had also had some hemorrhagic eruption on the body. Upon admission to the hospital, she complained of pain in the left flank and left hypochondrium which she stated she had had for three months. She had vomited during the day, first undigested food, later some yellow material and, in the hospital, a great deal of dark, thick material resembling prune pudding. She had marked anemia. The gums were swollen, angry, tender, and bleeding. The abdomen was symmetrical—slightly distended, rigid all over and markedly tender. Over the arms, chest, back and legs a profuse hemorrhagic eruption appeared, the spots varying in size from a pinhead to some blotches. The pulse was small and very rapid. From time to time the patient writhed in pain. After she had been in the ward two hours she became suddenly worse, going into collapse. The abdomen became very hard. Laparotomy was performed by Dr. Eliot. The peritoneal cavity was found to be filled with gas and a large amount of dirty, black fluid, and a dark sediment containing stomach contents. Of the anterior wall of the stomach, a portion was lacking of the size of the palm of the hand extending from the greater curvature almost to the lesser. Through this opening the mucous membrane of the posterior wall was visible. She died in a few hours. The autopsy revealed a large part of the anterior wall of the stomach lacking as at operation. Most of the remaining stomach wall was black, with the mucosa raised and thickened, excepting an area near the fundus where the stomach appeared normal. Microscopic examination of the stomach wall showed, in places, the entire thickness necrotic, in other places the mucosa was necrotic over a normal muscularis, the outlines of the necrotic areas being sharply defined.

¹ Cf. ref. 2.

Balzer¹ reports a fatal case of purpura, with cerebral and cerebellar hemorrhages.

Weill² reports a case of purpura provoked by venous hypertension, which probably belongs to the group of purpuras caused by mechanical obstruction.

Likewise Friedman³ reports a case of purpura hæmorrhagica occurring after an injection of fibrolysin.

PURPURA FULMINANS. Several case reports have appeared during the year, but none presenting any new or noteworthy findings save one reported by Carnot⁴ of a case occurring with septicemia due to the parameningococcus.

Other cases are reported by Weill,⁵ Patent,⁶ and Vidal.⁷

TREATMENT. Under this heading can be discussed the treatment of all the foregoing bleeding diseases, and it is in regard to the treatment that the greatest advances have been made.

From a review of the literature, it becomes strikingly apparent that the successful handling of these cases by the old methods of therapy is being rapidly discarded, although isolated cases are reported in which the use of the calcium salts, oil of turpentine, and various hematinic preparations have been successful; but such cases usually represent the milder forms of the purpuric diseases, and in no case has the bleeding in hemophilia been successfully checked.

Instead of drugs, therapeutists are now turning their attention to animal and human sera, and the more recently advocated peptone of Witte.

Some writers still strongly advocate the use of *animal sera*, notably Weil, who, although antedated by nearly ten years in the successful treatment of hemophilia by Bienwald,⁸ is really the father of the therapeutic use of fresh animal serum in the treatment of these diseases.

He reviews the work of several writers on the use of peptone injections, laying stress on the frequent reactions following their use, such as fever, chills, nausea, headache, local pains, erythemas, etc.

While he has not followed out the technique advised by Nolf, he feels that the better remedy still remains in the use of animal sera.

In a recent article,⁹ he says: "in any case, it is very interesting to know that against a bleeding diathesis so grave as hemophilia, and against which, until recent years, we have been so entirely helpless we

¹ Bull. Soc. Franc. de Dermat. et Syph., Paris, 1911, xxii, 197.

² Bull. Soc. méd. de Hôp. de Lyon, 1911, x, 167 to 172.

³ Therap. d. Gegen., Berlin, 1911, 205 to 207.

⁴ Bull. et Mém. Soc. Méd. de Hôp. de Paris, 1911, xxxi, 74 to 83.

⁵ Arch. de Méd. d'enf., Paris, 1911, xiv, 610 to 612.

⁶ International Clinics at London, 1911, ii, 66 to 68.

⁷ Langua Doc. Méd. et Chir. Toulouse, 1910, xviii.

⁸ Deut. med. Woch., 1897, p. 28.

⁹ Cf. ref. 24.

are now in the possession of a valuable weapon in the injections of animal serum. It is truly to be considered a new treatment worthy of study."

Patek¹ reports a case of sporadic hemophilia with recovery when treated by an antitoxin horse serum.

While some of the older workers prefer the use of *human blood serum*, notably Welch,² who has treated 18 cases of melena neonatorum without a death, there has been a tendency to favor the use of *human whole blood* in preference to the serum, on the grounds that whole blood is more likely to supply substances which might be lacking, and which are necessary to the coagulation of the blood, and for the reason that it is easy to obtain and can be used immediately.

Schloss reports 7 cases of bleeding in infants treated by injections of whole blood, from 5 to 10 c.c. injected subcutaneously into the loose tissues of the back. Six of these infants recovered, and one died.

Moss³ reports 6 cases of bleeding, occurring as complications of other diseases, treated by injections of rabbit and horse sera with reasonably fair success as regards the controlling of hemorrhage, and one interesting case in which he used defibrinated human blood. He reports it as a typhoid case, but which somewhat resembled purpura hæmorrhagica, in a male, aged thirty-one years, with bleeding from the gums, hematuria, and hemorrhages from the bowels, with ecchymoses and purpuric spots on the conjunctiva and abdomen. This patient received 262 c.c. of defibrinated human blood, injected directly into a vein, given in five injections, covering a period of seven days; the last injection was large, 200 c.c., but was well borne. This patient recovered.

Duke⁴ considers that the diminished number or absence of blood plates is the cause of the uncontrollable bleeding, and recommends transfusion as the only means of supplying the lack of the platelets.

Moss says: "As to the intravenous introduction of defibrinated blood or foreign serum, one perhaps must feel some apprehension of danger; but the condition to be combated is a dangerous one and justifies, in the present state of our knowledge, the risk we may run in carrying out these procedures. Moreover, theoretically, the danger from agglutination in transfusion is perhaps as great as the danger from thrombosis or hemolysis following the injection of defibrinated blood or foreign serum. So far as we are aware, no untoward results of a serious nature have been reported to follow the latter two measures. Finally, while it may be true that certain of the hemorrhagic diseases depend upon the lack of blood platelets and that this deficit can only be supplied by direct transfusion, still it is more probable that it is

¹ Wisconsin Medical Journal, 1910 to 1911.

² Cf. ref. 10, quoted by Schloss.

³ Johns Hopkins Hospital Bulletin, July, 1911.

⁴ Journal American Medical Association, 1910, lvxx.

not the platelets *per se* which contribute toward the checking of hemorrhage, but products which are set free upon their disintegration. These products are doubtless furnished just as well in serum, or defibrinated blood, as in the whole blood. It would seem that injections of serum or of defibrinated blood would answer as well as direct transfusion in all cases except those—if clinically there are such—which depend upon a lack of fibrinogen.

“A consideration of great practical importance is that in the case of injections of serum or of defibrinated blood one knows certainly that he gets the injection into the patient and one can accurately gauge the amount introduced, while in transfusion, except in the hands of an expert surgeon, there is much uncertainty of transferring any blood at all, and in no case can the amount transferred be satisfactorily determined.

“In our present state of knowledge, or lack of knowledge, concerning the causes of hemorrhages in these various conditions, the treatment is necessarily empirical. The most plausible explanation of any good which injections of serum or defibrinated blood may do is that fibrin ferment is thereby introduced into the circulation.

“Since it is known that fibrin ferment (thrombin) readily passes over into an inactive form (metathrombin) upon standing, it seems advisable to use serum or defibrinated blood as fresh as possible.

“If the patient has already been rendered anemic by serious hemorrhage, injection of large amounts of defibrinated blood directly into the circulation may not only check the hemorrhage, but may also combat the anemia. With this end in view, human blood should be used, since the red cells from one species cannot functionate in a different species, and it is likely that they would be quickly hemolyzed and give rise to toxic symptoms. In order to insure the best chance of success, the donor should be a person from the same group (according to the isoagglutination reaction) as that to which the patient belongs, thus avoiding possible danger from isoagglutination and isohemolysis.”

Lescohier,¹ after reviewing the literature, draws the following conclusions:

1. The coagulation period in hemophilic patients is greatly shortened by the injection of fresh serum.

2. The local application of fresh serum in wounds, in patients in whom there is a delayed coagulation of the blood, tends to act as a hemostatic.

3. The serum of any species is efficient in producing this phenomenon.

4. The sera of the ox and dog should be avoided, if possible, because of the toxic symptoms frequently attending their use.

5. Although possessing some efficiency, regular antitoxic sera are less satisfactory than freshly drawn material.

¹ Cf. ref. 34.

Among the continental writers, the administration of *gelatin*, and more particularly of *peptone of Witte*, has been earnestly advocated.

Nolf,¹ in a paper covering several cases treated by subcutaneous injections of propeptone, lays great emphasis on the superior hemostatic effect of propeptone compared to fresh serum, which, according to Nolf and Herry, in very severe hemophilia has been found inefficient.

He mentions, also, a case of Nobecourt and Tixier in which five injections of serum failed to produce any appreciable effect on the hemorrhagic condition, which, however, improved immediately after subcutaneous administration of propeptone.

Nobecourt and Tixier² found that subcutaneous injections of propeptone provoked certain reactions: fever, headache, vomiting, and pain to a greater or lesser extent. Nolf, however, in several cases has noted none of the foregoing symptoms, but merely a little local tenderness around the site of the injection, with a slight elevation of temperature in children, but not in adults. And he attributes the difference in his findings, and those of Nobecourt and Tixier, to a difference in technique of administration. Nolf warns against many of the products sold by manufacturing houses as peptone of Witte. He has gotten his best results with a peptone rich in propeptone (albumoses), commonly used in laboratory work for culture media. When placed in fresh salt solution, the mixture becomes turbid, but clears on boiling, with formation of floccules. It is then filtered hot and sterilized to 120°. This gives a perfectly clear solution and this only should be used, as turbid solutions produce greater local and general reactions. The ordinary dose is 10 c.c. of a 5 per cent. solution. Injections are given deeply into the flank muscles but guarding against introducing it into a vein.

Besides of use in the hemophilia and purpura group, Nolf advocates its use in internal hemorrhage, and reports good results in the control of renal and intestinal hemorrhage.

Scurvy. Very little literature on this subject has been written during the last year, and no noteworthy advances in the etiology or the treatment have been made.

Hewetson,³ writing on the *etiology of scurvy*, draws his conclusions from some 400 South African boys, ranging in age from fifteen to thirty-five years, of whom 134 showed scorbutic gums at one time. Their general health and condition previous to this was good. The boys were all employed in a colliery in South Rhodesia, situated in an unfavorable climate having a reputation for prevalence of scurvy and pneumonia; really an endemic centre of scurvy. The colliery diet was as follows:

¹ Bull. et Mém. de la Soc. des Hôp. de Paris, 1910, 3 S., 434.

² Ibid., 1910, 254 to 265.

³ Transvaal Medical Journal, Johannesburg, April, 1911, vi.

Fresh mixed vegetables, $\frac{3}{4}$ pound per week.

Potatoes, $1\frac{1}{2}$ pounds per week.

Fresh meat, 1 pound twice weekly.

Kaffir beer, $1\frac{1}{2}$ pints thrice weekly.

In May, June, and July, $\frac{1}{2}$ pound per week of pumpkins were added.

The caloric value of the food was about 5000, from which doubtless some waste occurred.

Hewetson sums up by quoting from Goadby's¹ conclusions:

1. That the mouths are invariably acid to litmus.
2. That although dental caries is not present, turgidity and early inflammation of the gums exist in a large number, and definite gum affections are present in a very considerable number.
3. That in the healthy mouths free from caries a considerable number of the organisms of putrefaction are present, associated with only a small number of organisms capable of producing acid from carbohydrates.

INFANTILE SCURVY, OR BARLOW'S DISEASE. Grasty,² in an excellent article, covers the subject in a thorough fashion. He declares infantile scurvy to be "distinctly an infection of artificially fed children, and though, as stated, it has greatly increased in frequency during the last twenty or thirty years, it is still rather rare."

Of 100 cases analyzed, 8 occurred between the ages of six and eleven months, with the largest number—namely, 20—occurring at the eighth month. Boys seem more affected than girls. Unfavorable social conditions predispose. The effects of season are not certain.

Two factors are necessary in the causation of Barlow's disease:

1. The kind of food the child has had, only artificially fed children are affected.
2. A special individual susceptibility, as shown by the fact that one twin may thrive and the other become affected.

Ashby, of England, in 1894, artificially produced scurvy in a baby by the use of "municipal humanized sterilized milk." Liebig, Cheney, Corlette, and Jones all agree with the idea that the disease is wholly due to prepared and humanized foods.

Sterilized and prepared milk of various sorts come first, then pasteurized milk and simple boiled milk, then milk and flour mixture, and prepared flour alone, and, finally, oatmeal gruel and rice gruel. With the use of raw cow's milk, the disease does not occur. Thus scurvy is a preventable disease. No efficient substitute has been found for fresh fruit and vegetable juices in preventing the disease.

Teste and Beri claim to have found a diplococcus which they consider the cause of the disease. This is not yet accepted.

Jahannesson advances the theory that infantile scurvy is due to some toxin arising in the food, and that this affects only certain susceptible

¹ British Medical Journal, September, 1910.

² American Journal Obstetrics, New York, 1910.

children, while the great majority thrive on the same nourishment, and this would most easily explain the whole symptom-complex, and the prompt action of dietetic therapy the result of a simple change in diet.

"The clinical picture of the fully developed disease is most striking—an infant who has been fed upon one of the patent foods with or without milk, or on milk which has been condensed, sterilized, or otherwise altered, has been ailing for weeks, has taken food badly and probably lost weight; moreover, the mother says it cries whenever it is touched, and has lost the use of its limbs. The infant is pale, it lies quiet until approached. The legs lie motionless; it cries out in dread of being touched, the thigh flexed and abducted. There may be some swelling of part of one or the other of the limbs, obliterating the normal curve. The arms are less often affected. Any handling of the limbs causes a sharp cry of pain. If teeth are present, the gums around them are swollen and purple, often projecting like a mass of granulations, almost hiding the teeth and bleeding readily when touched. The urine is smoky, if not red with blood.

"Such are the most important symptoms present and to recapitulate them, they are:

"1. Anemia.

"2. Pain on movement.

"3. Enlargement of bones—often separation of the osseocartilaginous junction.

"Barlow says when such separation occurs at the junction of the ribs and the sternum, 'the sternum with adjacent costal cartilages and a small portion of the contiguous ribs appear as though they had been fractured by a blow from behind. This phenomenon is almost specific. The bone most involved is the lower end of the femur.'

"4. Hemorrhagic swelling and softening of the gums.

"5. Hemorrhagic swelling of the eyelids and exophthalmos.

"6. Extravasation of blood into the skin and mucous membranes.

"7. Hematuria occurs in 10 per cent. of the cases.

"8. The temperature is irregular, with no fixed type.

"The course is chronic, and the mortality is still high, as the diagnosis is not often made.

"The pathological changes consist chiefly in a characteristic affection of the bone marrow, and comprise a change of the normal lymphoid marrow into a tissue poor in cellular elements; consequently the ends of the bones become brittle, together with anemia and hemorrhages, particularly the subperiosteal variety, although, however, hemorrhages may occur also in the parenchyma of internal organs and of the intestines. (It would be well to investigate the leukocyte count in more cases. This seems generally to be omitted.)"

Barlow's disease is most often mistaken for rheumatism—but should also be differentiated from rickets, periostitis, osteitis, osteomyelitis,

osteosarcoma, and anterior poliomyelitis. There are few diseases in which the effect of *treatment* is so striking as in infantile scurvy. A proper change in diet, without the help of any medication, leads in a short time, even with greater rapidity than in ordinary scurvy, to a complete change in the condition of the patient. Kerley states that orange juice is the specific for the disease.

In place of the food given previously, the child is placed upon fresh, raw, or, at most, briefly heated cow's milk from a reliable source. Besides this, raw-meat juice should be given and the amount of fresh fruit juice from oranges, grapes, lemons, cherries, currants, blackberries, apples, pears, apricots, huckleberries, etc., sweetened with sugar.

"As far as I know, the patent or proprietary meat juices are of no value as antiscorbutics. The superior advantage of the use of the potato as an antiscorbutic seems to me undeniable, and it is of value with carrots, cabbage, cauliflower, etc."

Lenhardt¹ reports a case of *maladie de Barlow* in a child, aged five months, who had been sick for two and one-half months. A differential diagnosis had to be made between scurvy, osteomyelitis, tuberculous arthritis, Pott's disease with paraplegia, and simple rheumatism. The therapeutic test was used, and when placed on ten drops of lemon juice in a bouillon of fresh vegetables, four times a day, the child made a remarkably quick recovery, and in several weeks was entirely well.

Brachi² reports a case of a child, aged seven months, one of twins, who had been breast-fed for six weeks and then placed on sterilized milk, who developed scurvical symptoms which entirely cleared up on an antiscorbutic diet.

In the discussion, Dr. Carr calls attention to the supposed rarity of infantile scurvy following feeding on sterilized milk, saying that the vast majority occur in children fed on patent foods or condensed milk. Why so few cases develop on sterilized milk is questionable. Carr attributes the danger to lie in the prolonged sterilization of the milk and states that the danger is infinitesimal from a milk that has been raised to the boiling point for only a very short time.

Bott³ reports an interesting case, diagnosticated *Barlow's disease*, of an infant, aged fifteen months, with marked signs of rickets, who developed extensive blistering of the skin of the neck, face, and chest, closely resembling a scald. The onset of the blistering was preceded by nausea and vomiting. Later, blisters developed on the thighs and abdomen, and tenderness developed over the tibia and femur, with small, subcutaneous hemorrhages. Small doses of lime juice was prescribed, with immediate improvement in the local and general condition. Previous to the onset of the illness, the child had been fed on sterilized milk and meat juice.

¹ Ann. de Méd. et Chir. Infantiles, Paris, 1911, xv.

² London Lancet, 1911, i, 662.

³ Ibid., p. 878.

Dewey,¹ in an original paper on the ocular symptoms of infantile scurvy, says: "The ocular symptoms mentioned in connection with scurvy are optic neuritis, retinal hemorrhage, ecchymosis, and edema of the lids; ecchymoses of the conjunctiva; chemosis of the conjunctiva; hemorrhage of the conjunctiva, nyctalopia, and exophthalmos.

"Of these symptoms, exophthalmos alone is peculiar to infantile scurvy. Optic neuritis and retinal hemorrhage, as far as I know, have never been observed in infantile scurvy.

"It hardly admits of doubt that some of Barlow's cases were studied with the ophthalmoscope, and if the fundus changes had been present they would have been noted.

"Thus a condition sometimes happens in infantile scurvy that might well give rise to optic neuritis as shown in two postmortem examinations made by Southerland, in each of which he found extensive hematomas in the dura mater. Ecchymosis of the eyelids is frequently present in the infantile form of scurvy, but ecchymosis of the bulbar conjunctiva is generally absent, and chemosis of the conjunctiva has never been noted."

Dewey reports a case of an infant, aged eleven months, in whom there was marked exophthalmos of the left eye, developing after a violent crying spell lasting half an hour. The left eyelid was black and blue, with some ecchymosis of the bulbar conjunctiva to the nasal side. The eyeball was normal in all cases reported, but was pushed upward or downward, and its motion was somewhat retarded. Pupils reacted to light. Ophthalmoscopic examination, after using a mydriatic, showed no hemorrhages in the fundi.

This child was a typical case of Barlow's disease plus the ocular symptoms. Five days after beginning the antiscorbutic diet, the proptosis in both eyes had almost subsided and the ecchymosis of the lids had disappeared rapidly. The improvement in the general condition was very striking.

Chlorosis. Few papers of any great value have made their appearance during the last year relative to this condition. Very little has been reported on etiology; more interest has been directed toward *treatment*. Handmann² believes that the association of chlorosis and thyroid enlargement in 25 out of 44 cases cannot be a coincidence. In 4 of the cases, the enlargement of the thyroid was progressive; and in 3 other cases, there were symptoms of Graves' disease. The hemoglobin percentage was rather high, being over 80 per cent. in more than half the cases; and, in 23 cases, over 40 per cent. The size of the goitre remained the same while recovery under iron was in progress.

Hird³ calls attention to the fact that neuroretinitis has been a very

¹ Annals of Ophthalmology, April, 1911.

² Münch. med. Woch., May 30, 1911, lviii, No. 22.

³ Practitioner, February, 1911, p. 275.

much neglected symptom of chlorosis, although Gower drew attention to it more than thirty years ago. The author reports 2 cases in which it was present, and in which rest in bed and iron, combined with arsenic, improved both the chlorosis and the neuroretinitis. The first patient had failing vision, gastric disturbances, edema of the legs, and menstrual irregularity. Pallor of the mucous membranes and a pulmonary systolic murmur were the only physical abnormalities. The blood examination showed 46 per cent. of hemoglobin, 2,408,000 red cells, and 7800 white cells. Stains presented no abnormality. Both eyes were equally involved, and showed the general appearance of albuminuric retinitis.

The second patient complained only of impaired vision and menstrual disturbance. Physical examination was negative, except for pallor of the mucous membranes. There were 75 per cent. of hemoglobin, 4,280,000 erythrocytes, and 9150 leukocytes. The retinae were in this case very similar to the others.

Seiler¹ has compared the effects of iron and arsenic, separately and in combination, in 33 cases of chlorosis. The use of arsenic alone, in the form of arsenious acid or by subcutaneous injection, seemed to be without any effect. Iron, as a modified Bland's pill, gave satisfactory results in increasing both the red cells and the hemoglobin. The effect of the combination of iron and arsenic were so astonishingly good, however, as to warrant Seiler in concluding that iron and arsenic combined is the treatment *par excellence*.

Zwetkoff² reaches the same conclusions as Seiler has reached, as the result of his experiments with iron and arsenic. He finds that arsenic alone, as opposed to its value in pernicious anemia, is practically of no use in chlorosis. Iron in the form of Bland's pills results in an increase in hemoglobin and in the erythrocytes, when they are decreased. This increase is not rapid when measured by the single weeks. The treatment with iron and arsenic combined gives a more definitely increased improvement as compared with the results of treatment with iron alone. The hemoglobin increases more rapidly, and the number of red cells shows an increase of two or three times that obtained when iron alone is used. Arsenic is employed in the form of arsenious acid in the dose of 0.002 to 0.003 gm. three times daily. Combined with the ordinary doses of iron, Zwetkoff believes that the increased benefit derived is not only a question of the added action of arsenic to iron, but it is to be explained by the fact that arsenic directly stimulates the bone marrow that is being considerably supplied with iron to increased blood production.

¹ Deut. med. Woch., July 20, 1911, xxxvii, No. 29.

² Zeit. f. exper. Path. u. Therap., 1911, ix, 393.

Leukocytes. IN TUBERCULOSIS. Watkins¹ has made a study of the differential count of the leukocytes in the different stages of tuberculosis and his work confirms that of Webb, and others, that the presence of a relative lymphocytosis is a favorable prognostic sign. Under the term "lymphocyte" he includes the small mononuclear leukocyte (the lymphocyte of Ehrlich or small lymphocyte of American writers), and the large mononuclear leukocyte (the large lymphocyte of American writers). The average lymphocyte count of healthy adults, in his series, was 41.5 per cent.; that of his cured tuberculosis patients, 45 per cent.; of his arrested cases, 38 per cent.; and of his slowly or rapidly progressing cases, 25 per cent. He has noted that the percentage of lymphocytes in healthy persons who live in a high altitude is above the average of those whose habitat is nearer the sea level. The increase in the percentage of lymphocytes was found to occur chiefly among the large mononuclears whose reputed origin is in the bone marrow. They develop rapidly and may grow two or three times their normal size with a large irregular cytoplasm and a very large and sometimes irregular nucleus.

Miller and Reed,² in a paper read before the American Climatological Society, in June, 1911, state that the study of the leukocytes gives valuable information in the prognosis and clinical course of pulmonary tuberculosis. In unfavorable cases, they found (*a*) a leukocytosis; (*b*) an increased percentage of neutrophils; (*c*) a diminished percentage of small lymphocytes; (*d*) a diminished percentage of eosinophils; (*e*) a marked shifting to the left of Arneeth's blood picture; conversely, changes in the opposite direction were favorable.

Solis-Cohen and Strickler³ report that they have found that improvement in cases of pulmonary tuberculosis was associated with an increase in the proportion of lymphocytes at the expense of the polymorphonuclear cells. The reverse condition also obtained as the patient grew worse. As improvement began, there was found to be an increase in the proportion of polymorphonuclear cells containing one and two nuclei, which was maintained for several weeks but not indefinitely. The leukocytic picture varies with the resistance of the patient rather than with the extent of the disease.

Lewis⁴ lays more stress on the condition of the neutrophile in making his prognosis in pulmonary tuberculosis. Under normal conditions, the nucleus does not show more than five lobes, but the presence of certain abnormal conditions may increase this to eight or ten; while tuberculosis may prevent it from having more than one, two, or three lobes. The neutrophilic blood picture, he thinks, is of much value in

¹ Journal of American Medical Association, December 30, 1911, lvii, 2129, No. 27.

² Ibid., August 5, 1911, lvii, 504, No. 6. Abstracted.

³ American Journal of the Medical Sciences, November, 1911, cxlii, No. 5.

⁴ Bulletin Johns Hopkins Hospital, December, 1911, xxii, No. 250.

prognosis when taken in connection with the differential count, but not of much use in the diagnosis.

IN MALARIA. Thomson¹ finds that, during active malaria, the number of leukocytes in the peripheral blood is decreased. During quiescent malaria and in cases apparently cured by treatment, the leukocytes are much increased. During the chill and fever, the percentage of mononuclears (especially the large mononuclears) is low. With the fall of temperature, the mononuclear percentage rises very high. This fluctuation in the total mononuclear percentage is maintained for a long time after continuous quinine treatment. In apparently cured cases of malaria, the mononuclear percentage is lowest at the time of day at which the chills and fever occurred and at this time there occurs also a marked leukocytosis which may last only a few hours. It would appear from Thomson's work that the sporulating of a large number of malarial parasites causes a leukopenia, while a very small number on sporulating causes a leukocytosis.

IN PERFORATED GASTRIC ULCER. Mannheimer² advocates the making of differential blood counts after perforation of a gastric ulcer. The curve of the neutrophile is a good index of the resisting powers of the organism, although not so regular as in appendicitis, as the hyperleukocytosis does not develop until the peritoneum begins to be inflamed.

IN MEASLES. Hektoen and Eggers³ produced measles in the monkey and found that the leukocytes appear to behave very much as they do in human measles. Preceded by a more or less distinct leukocytosis, there occurs a leukopenia of variable degree in what would correspond in a general way to the latter part of the pre-eruptive and the early part of the eruptive periods. This leukopenia involved principally the neutrophiles, the lymphocytes being relatively somewhat increased. Inasmuch as these monkeys, at the same time as they received the measles virus, also received a large amount of foreign protein in the form of human blood, it is, of course, questionable whether the changes in the leukocytes should be attributed to the action of the measles virus only. It might be said that the leukopenia is one of the results of the introduction of human blood and connected with the resulting processes of antibody formation and sensitization. While further observations are necessary in order to settle this point, it may be said that in monkeys injected with human blood for other purposes and in larger quantities than those used in these experiments, they noted either no leukopenia at all or only slight and transitory diminutions in the counts. Hence it may be concluded that the leukopenia most likely represents a reaction to the measles virus.

¹ *Annals of Tropical Medicine and Parasitology*, April, 1911.

² *Mitteilungen aus den Grenzgebieten der Med. und Chir.*, xxiii, No. 4.

³ *Journal of American Medical Association*, December 2, 1911, lvii, No. 23.

Normal Count. Bunting¹ estimated the normal total leukocyte count and the normal differential count from examination in a large number of normal cases. The average of his total count is 7580; of the neutrophiles, 54.6 per cent.; of the small mononuclears, 33.1 per cent.; of the eosinophiles, 3.2 per cent.; of basophiles, 0.8 per cent.; of the large mononuclears, 1.6 per cent.; of the transitionals, 7.4 per cent.

Eosinophiles in Children. Schloss² concludes, from his examinations of the blood of 8 apparently healthy infants, that there is no physiological eosinophilia in childhood. He thinks that 5 per cent. of eosinophile cells may be considered the upper limit of normal, and anything over 6 per cent. as pathological.

Hemolytic Jaundice. This relatively rare condition is receiving more attention from observers in different parts of the world. The result will probably be that, with more light turned on an obscure disease, and one easily confused with other and better known ones, more cases will be discovered. The fact that the symptoms are few and that the laboratory is depended on in a great degree to establish the diagnosis probably accounts for the slight attention hitherto given it.

Thayer and Morris³ make 2 cases of congenital hemolytic jaundice a text for a full description of the disease. Murchison (1883) was one of the earlier observers of the condition, but not much attention was given to it until Minkowski (1900) reported the history of a group of individuals belonging to one family. All of these showed a remarkable syndrome, characterized by chronic acholuric jaundice, splenomegaly and urobilinuria. Bettman, at the same time, described a similar case, in which the jaundice seemed to deepen after exercise, excitement, and exposure to cold.

The condition may or may not be familial. The stools are of normal color; the urine is free from albumin, blood, and hemoglobin. Urobilin is constantly present, as can be shown by the production of a green fluorescence on adding to an amylic alcohol extract of the urine a solution of 1 per cent. zinc chloride in ammoniacal alcohol, or by the spectroscope. Bile is never present. The red cells usually vary from 2,500,000 to 4,000,000, with the hemoglobin in proportion. There is usually considerable anisocytosis, but little or no poikilocytosis. The average size of the corpuscles is rather below normal. Polychromatophilia is usually well marked. Chauffare, in 1907, discovered a marked fragility of the red cells on exposure to hypotonic solutions of sodium chloride. He found that the beginning and the end of hemolysis were, respectively, 0.62 per cent., and 0.34 per cent. in this condition; whereas, the normal limits are 0.42 per cent. and 0.32 per cent. A little later Chauffard discovered another interesting fact—the pres-

¹ American Journal of the Medical Sciences, November, 1911, cxlii, No. 5.

² Archives of Internal Medicine, December, 1911.

³ Johns Hopkins Hospital Bulletin, March, 1911, p. 85.

ence, on vital staining, of a peculiar basophilic granulation of the red cells. Vaughn had reported its presence in the normal blood of 0.5 to 1.8 per cent. In this condition it varies between 10 and 20 per cent. In pernicious anemia and other forms of blood regeneration, the rate is also high; but not so much so as in this condition. It is quite distinct from the basophilic degeneration of Grawitz and others, in that it has a quite different arrangement and is brought out only by vital staining. The blood serum is usually of a clear, yellowish color, and gives a positive test for bilirubin; although urobilin is generally negative. Leukocytes are commonly normal in number, and the only departure from the standard differential count is a slightly increased percentage of eosinophiles and an occasional myelocyte and normoblast.

On autopsy, the blood appears normal. A few small pigmented stones have been found in the gall-bladder. The spleen is enlarged, and shows, microscopically, simple hyperplasia and hyperemia. The kidneys show extensive siderosis, much of the iron being combined with proteid.

The symptoms are surprisingly few. Except for occasional attacks of pain in the region of the gall-bladder, suggestive of biliary colic, and accompanied with fever and an increase of jaundice, the patients are usually unconscious of any disability. There is no itching nor any bradycardia.

ACQUIRED HEMOLYTIC JAUNDICE. In this same paper Thayer and Morris describe the acquired variety of the disease, the name having been given to it by Widal and Abrami, who reported the first cases. It has been shown by different observers to have followed various accidents, such as abortion and shock; by others, to have appeared without any striking accompanying condition; and by still others, to have complicated a variety of conditions, such as cancer, syphilis, and malaria. Brulé divides the cases into *primary*, arising without apparent cause or during the course of some acute transient malady, and persisting independently; and *secondary*, observed in a transient manner, associated with acute infections or poisons, or as a terminal phenomenon in the course of a chronic disease. A striking difference between the acquired and the congenital is the intense and varying anemia in the former. The blood picture frequently resembles that of pernicious anemia, and shows evidence of regeneration, granular corpuscles on vital staining, and a fragility of the red cells. This fragility is not apparent with unwashed corpuscles; and in this respect it differs from the congenital form, which shows it in both the unwashed and the deplasmated states. A special characteristic of the blood of patients with acquired hemolytic jaundice is its auto-agglutinative power, easily determined by a simple test described by Brulé. Many of the patients have attacks of pain in the region of the gall-bladder, associated with fever and exacerbation of the jaundice. The gall-bladder has been

found practically empty (except for a little blood in one case) in all cases operated on.

These cases simulate cholelithiasis, pernicious anemia with jaundice, chronic infectious cholangitis with splenomegaly, and Banti's disease or Hanot's cirrhosis. Some observers emphasize a strong relationship between them and splenic anemia. The absence of bile in the urine, its presence in the blood serum, the urobilinuria, the granular corpuscles on vital staining, fragility of the red corpuscles, and the auto-agglutinative power of the serum, ought to establish the diagnosis.

The chief feature of the autopsy in the acquired, as well as the congenital form, has been the siderosis found chiefly in the kidneys.

Recovery is unknown in the congenital form; but in the acquired, long-continued treatment with iron may result in apparent cure.

Parkes-Weber¹ is convinced that moderate splenomegaly in children of from five to sixteen years of age may be almost the only evidence of an inherited syphilis. It is often accompanied with attacks of obstructive jaundice, and with an excess of urobilin and urobilinogen in the urine. Liver cirrhosis, with or without ascites, may be associated.

Antisymphilitic treatment should not be used rashly, on account of the general delicacy of the patients and their liability to renal and catarrhal complications. Iodide of iron seems to be of most use. The anemia is usually only temporary, and, in some cases, there may even be a polycythemia. Abdominal crises of uncertain origin may occur. Familial splenomegaly with the above-mentioned symptoms may be associated with syphilis; but it is usually recognized in connection with congenital chronic acholuric (hemolytic) jaundice, and with primary splenomegaly of the "Gaucher" type. Some cases of splenomegaly in children with syphilis ultimately present the characteristic clinical picture of Banti's disease.

Van den Bergh² reports a case of hemolytic jaundice with hemoglobinuric crises. The patient had had recurring jaundice, with occasional attacks of hemoglobinuria, since 1899. The symptoms of the attack were anemia of more or less well-marked degree, cardiac depression, and pain in the hypogastrium; and they persisted in milder form after the attacks had subsided. The carbon dioxide test showed well-developed fragility of the red cells *in vitro*.

In a well-marked case of acquired hemolytic jaundice with the typical clinical, hematological, and biological symptoms of the disease, Micheli³ reports the favorable results of splenectomy in a case of three years' standing. Slight improvement had followed various internal remedies. Immediately following splenectomy, the urobilin disappeared from the urine and the jaundice disappeared. The hemoglobin rose from 30

¹ British Journal of Children's Diseases, March, 1911.

² Revue de Méd., January, 1911, xxxi, No. 1.

³ Wien. klin. Woch., 1911, xxiv, 1269, No. 36.

to 65 per cent.; and the red cells, from 1,800,000 to 4,000,000. The resistance of the red cells to hypotonic salt solution rose promptly to normal, and the reticulofilamentous substance on vital staining fell, from 25 to 50 per cent. before splenectomy, to normal. In two months, the patient was practically well.

Banti's Disease. The amount of original work on the subject of Banti's disease during the last year has not been very great. There is not much divergence of opinion as to symptoms; but the question of etiology, being unsettled, has given rise to more discussion. Surgery has not been tried often enough to decide the matter of its value.

Seiler¹ insists that the form of splenic anemia attended with cirrhosis of the liver, enlargement of the spleen and ascites commonly called Banti's disease is not a special morbid entity; it is merely a syndrome, which may be due to various known etiological influences. The syndrome from various causal factors may be apparently identical, as also the autopsy findings in various organs. In the 4 cases reported in detail, the clinical course was very insidious, the anemia, enlargement of the spleen and tendency to hemorrhage being the first symptoms. This stage may last for years, and then be accompanied with digestive disturbances and complicated with jaundice. Then, in the course of a few months, cachexia and ascites develop—the terminal stage. Nothing could be found to explain the syndrome in two of his cases, except severe digestive disturbances a few years before, with jaundice and intense indicanuria. In the second case, a severe trauma was accepted as the causal factor; but the discovery of a positive Wassermann reaction suggested inherited syphilis, confirmed by the history of the death in infancy of three brothers. Inherited syphilis was also the presumable cause of the syndrome in cases reported by Marchand and Chiari. The third patient was a man, aged forty years, and the retrospective diagnosis was that the Banti syndrome had developed in consequence of an abdominal affection seventeen years before, causing thrombosis in the portal vein with the development of an extensive collateral circulation. Under the influence of the portal thrombosis, the digestive processes had been altered in such a way that toxic injury of the liver and spleen resulted, with the Banti syndrome as outcome. Necropsy revealed extensive communication between the portal circulation, the inferior and the superior epigastric veins, with the veins much enlarged. Nature had performed what surgeons strive for in the Talma operation, and yet there was extreme ascites. This would seem to indicate that the Talma operation has no logical basis for the cure of ascites in this condition.

Hull² reports a case of splenic anemia with rather unusual features. The patient was a youth, aged seventeen years, and a native of Turkey.

¹ *Correspondenz-Blatt f. Schweizer Aerzte*, November 1, 1911, xii, No. 31.

² *Journal of American Medical Association*, December 9, 1911, lvii, No. 24.

His family history was negative. The previous medical history and habits threw no light on the case. The illness began with general weakness, dyspnea, headache, and cardiac palpitation, in February, 1911. In August, 1910, he had noticed a swelling in the abdomen, which had given him no discomfort. In March, 1911, he had frequent night sweats and felt feverish. There was no cough, hemoptysis, epistaxis, hematemesis, or melena. No swelling of the feet or lower abdomen had been noticed. On admission, in April, 1911, the lungs were found to be negative; the heart showed a blowing, systolic murmur at the second left intercostal space; the liver extended one finger's breadth below the costal margin; and the spleen extended downward and mesially nearly to the umbilicus. There was no evidence of ascites. The urine showed a faint trace of albumin. Examination of the blood showed hemoglobin, 38 per cent.; erythrocytes, 2,650,000; leukocytes, 1800. The differential count was about normal. There were no Leishman-Donovan bodies or malarial parasites found in the circulating blood. The feces were negative. The Wassermann reaction was also negative. Splenic puncture and splenectomy were suggested and refused. The patient improved and left the hospital. Hull regrets that they were unable to exclude kala-azar absolutely, as the patient refused splenic puncture. He thinks that the unusual features of the case were the absence of hemorrhages from the mucous membranes; the presence, on several occasions, of an excess of eosinophiles, myelocytes and nucleated red cells; and the irregular and elevated course of the temperature over a period of at least three months.

Hultgen¹ reports a case with a history of syphilis and alcoholism, in which splenomegaly had been observed three years before admission in November, 1910. In addition, there was an enlarged liver with ascites and anemia. There had been no hemorrhages and very little gastro-intestinal disturbance. In discussing the case, Hultgen states that he believes the splenomegaly to be the central figure in the clinical picture, but that he also accepts the findings of Dock and Warthin of phlebosclerosis and calcareous degeneration of the splenic and portal veins, which they explain as following a primary thrombosis of these vessels. He would go farther, and suggest the antecedent endophlebitis as the initial lesion. He regards splenomegalic anemia as a clinical entity, regardless of the cause of the splenic endophlebitis, which in this case was luetic, and in Marchand's² case was due to kala-azar. He bases his diagnosis on the splenomegaly, the anemia with leukopenia, and the ascites.

Ottinger and Marie³ report a case of Banti's disease in which splenectomy was followed by the death of the patient from postoperative

¹ Journal American Medical Association, November 4, 1911, lvii, No. 19.

² Med. Klinik., January 15, 1911, p. 104.

³ Revue de Méd., May, 1911, xxxi, No. 5.

hemorrhage. The patient was a young man whose spleen had enlarged gradually over a period of several years. Slight jaundice was present, and a number of hemorrhages from the mucous membranes. At autopsy, lesions were found in the splenic vein, spleen, and liver.

Ungar¹ believes that Banti's disease deserves a place of its own as a clinical entity, and that chronic intestinal auto-intoxication plays a prominent role as a causal factor. He thinks that sufficient evidence has been adduced to prove that the splenomegaly preceded the liver cirrhosis. In his opinion, syphilis, tuberculosis, and alcoholism do not play an important part. Splenectomy after the second stage offers no hope of a cure.

Sawyer² reports a case of splenomegaly with hematemesis, which ended fatally. The patient was a Japanese with a previous history of malaria. There were four attacks of bleeding from the gastrointestinal tract, the last one proving fatal. Autopsy showed the spleen greatly enlarged, no ascites, and the liver normal in size. The bleeding seemed to come from dilated esophageal veins. An unidentified parasite was found imbedded in the gastric mucosa.

Sawyer places this in the group of splenic anemias, which are considered by Osler as an intermediate stage between primary splenomegaly and Banti's disease. They are usually accompanied by gastrointestinal hemorrhages. He says that Osler supports the view that the disease is a chronic infective process with its chief seat in the spleen; and that the poisons cause the endothelial proliferation, the anemia, and ultimately cirrhosis of the liver.

Weber³ reports a case showing splenic and hepatic enlargement, ascites, early lymphatic enlargement, but later a practical subsidence of the tumors and marked leukopenia with anemia. In spite of the similarity of this symptom-complex and Banti's disease, he says that the microscope decides the condition to be lymphoma granulomatosum, or Hodgkin's disease. In this case, it would be impossible to make the diagnosis without a histological examination; and, in the absence of such, a diagnosis of Banti's disease would have been an excusable error.

Fuhs⁴ reports a case of Banti's disease in which splenectomy has been followed, after more than two years, by an apparent cure. The disease was probably between the second and the third stages, according to Banti's classification, with splenomegaly, enlarged liver, ascites and some jaundice, when the chance of cure after splenectomy is supposed to be good. As in a case reported last year by Paulieck, this patient was a girl, aged seventeen years, who had menstruated only once,

¹ *Wien. klin. Woch.*, March 9, 1911, p. 348.

² *California State Journal of Medicine*, January, 1911, ix, No. 1.

³ *American Journal of the Medical Sciences*, October, 1911.

⁴ *Ibid.*, November, 1911.

with a note made of scanty pubic and axillary hair. The Wassermann test was strongly positive. Specific medicinal treatment, *x*-rays, and arsenic had all failed to give any relief.

DIABETES MELLITUS

Although the literature of the last year has not brought forth any marked advance in our knowledge of diabetes mellitus, it has reflected the steady progress of the last few years in the working out of the details of the pathogenesis and altered metabolism of this interesting condition. This is perhaps best seen when the subject of treatment is under discussion, and a number of interesting papers have appeared on this phase, which, as a whole, are of a higher standard than is usual—a result of making the pathological physiology the basis of the therapy.

Classification. To anyone who has gone into the subject of diabetes mellitus in any detail, the lack of a satisfactory classification has been somewhat of a handicap. This lack of classification is undoubtedly due to the fact which is constantly becoming more evident, that we, under the term diabetes, are grouping together at least two, and possibly more, conditions which have little in common except a lowered carbohydrate tolerance. Austin¹ has taken up this question and laid emphasis upon the vagueness and indefiniteness of the terms “mild,” “moderate,” and “severe,” which are so commonly used to indicate degrees of severity. Likewise the morphological terms as “pancreatic,” “hepatic,” “adrenal,” etc., are vague and of little service to the clinician. As in all cases there is one common factor—the inability to properly metabolize carbohydrate—he suggests that this property be made use of to indicate the degree of severity of the disease, by expressing the extent of the lowered carbohydrate tolerances in terms of percentage. A person with normal carbohydrate metabolism would have an efficiency of +100 per cent. In a mild case, where from 10 per cent. to 30 per cent. of the carbohydrate ingested is excreted as sugar, the efficiency would be +90 per cent., +70 per cent., and so on. If all the carbohydrate ingested appeared in the urine, the degree would be represented by 0. In those cases of diabetes in which, in addition to complete carbohydrate intolerance, sugar is also built up from protein, we get a negative percentage. This may be calculated from the nitrogen of the protein by multiplying by 4—the nitrogen figures being obtainable from diet tables; 3.65 or 4 is the amount of sugar which may be obtained from 6.25 gm. of protein, which in turn is equivalent to 1 gram of nitrogen. This method is a simple one for comparing the

¹ Boston Medical and Surgical Journal, 1911, clxiv, 807.

varying tolerance in an individual case which is a constantly changing factor. It necessitates an approximately correct knowledge of the amount of carbohydrate in the food—such as may, for practical purposes, be obtained from diabetes tables—and a knowledge of the total twenty-four hours' output of sugar in grams. These are things essential to the proper treatment of diabetes mellitus and is the strongest point in advocacy of Austin's method. The ignoring of such important factors in the condition as acidosis, makes the practical application very limited in its use.

Etiology. In an address before the annual meeting of the American Medical Association, Hodgson¹ analyzed a large number of his cases, and laid stress upon the point that about 90 per cent. of the cases of diabetes are due to what might be called errors of metabolism, and that only a small percentage are due to some severe preëxisting pathological condition. A study of the habits of a number of these cases shows that one of the most fertile causes is a long-continued toxemia or auto-intoxication resulting from gross errors in eating. He thinks that such factors as alcoholism, arteriosclerosis, etc., seem to play a minor role in comparison with certain gross errors, among which he enumerates "too much food; bolting of food; reading, thinking deeply, or worrying while eating; using but partially cooked starches—all of which are contributing causes to the deranged metabolism." He believes that the present habit of eating large quantities of carbohydrate in an uncooked or but partially cooked state—batter cakes, corn-bread, graham crackers, etc.—contribute to the increasing number of cases.

Traumatic and Renal Diabetes. Several very interesting cases of these rather uncommon types are reported by Weiland.²

The following case is an excellent example of the traumatic type of case: A man, digging a well, was hit on the head by a wooden pail which fell from a height of about 25 feet. He was knocked unconscious for a half hour by the blow, but otherwise seemed to show no ill-effects, the wound healing without trouble. A week later, however, he developed polyuria, with intense thirst and lassitude, and a fortnight after the accident the urine showed 4.7 per cent. of sugar. The progressiveness of the case and the suddenness of the onset is typical of the traumatic type, which was undoubtedly due to some nervous lesion. The patient had been healthy previously, and there was no family tendency toward obesity or alcoholism.

He further describes three cases which are quite typical of the so-called "renal type," whose existence has been denied. Here there was persistent glycosuria, without apparent disturbance in the carbo-

¹ Journal of the American Medical Association, 1911, lvii, 1187.

² Deut. Arch. f. klin. Med., cii, No. 2.

hydrate metabolism. The glycosuria was a casual discovery, as there were none of the usual subjective symptoms, nor was polyuria present.

An examination of the blood showed the sugar content to be within normal limits. This absence of a hyperglycemia and the other symptoms of diabetes mellitus lead to the view that occasionally the kidney parenchyma is so injured that in some way it becomes permeable for sugar. In this the condition may be classed with alkaptonuria and cystinuria—diseases not threatening vital functions. As the degree of glycosuria is apparently in no way dependent upon the carbohydrate metabolism, strict diatetic regime is not called for. Such cases are extremely rare and require considerable study and observation over a long space of time before the diagnosis is justifiable.

Lipogenous Diabetes. Under this name Kisch¹ calls attention to the intimate relationship which exists between the two metabolic diseases, lipomatosis and diabetes mellitus. He divides obesity into two groups as regards its causation—one “alimentary” resulting from overfeeding with insufficient utilization of food; and, secondly, a “constitutional” type, resulting from inherited tendencies or from general systemic diseases, as alcoholism. Kisch claims that about 15 per cent. of the cases of the first type of obesity develop diabetes. These cases are slow in development, their cause extending over years, and they are apt to be of a mild grade of severity. He has found that these cases frequently show an alimentary glycosuria of transitory character, and considers it of unfavorable prognosis for the establishment of a true diabetes later in life. The explanation of this association, Kisch believes, lies in the accumulation of fat in the body tissues—a view contrary to Van Noorden’s, who speaks of a “diabetogenous obesity.” Kisch thinks the glycosuria is produced through metabolic changes due to the fatty infiltration of the liver, pancreas, and muscles—the collection of fat preventing the proper utilization of the sugar. An even more intimate association exists between the second, or constitutional, type of obesity and diabetes. In these cases the cells have a definite lowered power of oxidation, and in time lose their power of utilizing sugar. This is particularly marked in the juvenile type of lipomatosis in which the associated diabetes is apt to be very severe in character.

Pathological Anatomy. PANCREATIC CHANGES. The idea of the relationship between insular changes in the pancreas and diabetes has been gaining stronger ground each year, until at the present time the view that there is some interdependence is quite generally accepted. Last year we reported Cecil’s studies, and this year Weichselbaum² has published a still larger series of cases in which he has studied the histology of the islands of Langerhans. In 183 cases of diabetes examined, he found changes almost constantly present. Hydropic degeneration

¹ Münch. med. Woch., March 28, 1911, p. 677.

² Wien. klin. Woch., 1911, February 2, p. 153.

of the cells, leading to atrophy and disintegration, was present in 53 per cent. Sclerosis, both peri- and infralobular, was present in 43 per cent. of the cases—the sclerosis being more common in persons fifty years or over. In advanced sclerosis, hyaline degeneration was present. In some specimens from younger persons regeneration of the islands was observed, which was associated with hydropic degeneration. Atrophy of the parenchyma (acini) was noted at times. Weichselbaum interprets his findings as demonstrating that the essential factor in the relationship is not the presence of any one type of pathological change in the islands (sclerosis), but that the degree of involvement determines the development of the diabetes. The graver types are accompanied by arteriosclerosis as a rule. In a number of control cases examined, he occasionally found insular changes with some atrophy of the parenchyma. Weichselbaum states that he frequently found the islands reduced in number. Recently, however, it has been shown that the sectional method for the enumeration of the islands is of little value, and hence we must question the value of this observation.

Liver and Diabetes. It is interesting to note that among the numerous papers which have appeared dealing with derangements of the internal secretions as the essential cause of diabetes, now and then someone goes back to the older view that the liver is primarily at fault and that derangement of the glycogenic functions of this organ is the essential basis of the disease. MacLeod's¹ ideas are in line with this view, and his argument is largely based on the normal metabolism of sugar. He considers it the function of the liver to convert the large quantities of sugar, reaching it through the portal system from the intestine, into glycogen, which is stored up and again converted into sugar as the needs of the body tissues for carbohydrate demand. This general mobilization of sugar must be under the control of something in the blood. Failure of the liver to retain the excess of ingested sugar might be explained in one of two ways: It is possible that some fault of the liver cells prevents the conversion of the sugar into glycogen with sufficient rapidity to take care of it all, or secondly, there may be a failure to retain the glycogen after it has been formed from the sugar. MacLeod tends to this latter view, and, as a result of his experimental work, believes this variability in the glycogenolytic activity of the liver to be due to changes in the amount of the glycogen-splitting ferment in the liver. When the glycogenic mechanism of the liver is thrown out of order, the final result is the conversion of all available chemical substances into sugar in order to supply the demands of the tissues for carbohydrate. He further adds that as recent work in chemistry has shown that there are two distinct stereoisomeric varieties of dex-

¹ Cleveland Medical Journal, May, 1911, p. 436.

trose, which behave in a different manner to ferments, it is conceivable that the carbohydrate-splitting ferments can utilize only one variety, which is prepared by passing through a glycogen stage. Or, in other words, the glycogenic function of the liver is not simply one of regulation but one of active preparation of utilizable dextrose from isomeric sugars, which are not adapted for use by the body tissues.

Pathological Physiology. INTERNAL SECRETIONS. From year to year we have discussed various experimental work and hypotheses which have appeared in explanation of the somewhat complicated facts which have been discovered regarding the intimate relationship existing between carbohydrate metabolism and the internal secretions. We rather hesitate to go into this subject again but during this last year the various facts were so well gathered together and summarized by Van Noorden,¹ that we feel a discussion of his summary will bring this theory, which is obtaining quite widespread acceptance, up to the present time in a better manner than can be obtained from discussing individual work. The argument is briefly as follows:

The liver is the ultimate source of sugar production, but this function is under the control of the pancreas and suprarenals, the former inhibiting sugar production, the latter stimulating it. The pancreas, in turn, is under the control of the thyroid—the thyroid secretion inhibiting pancreatic activity. Thus, in cases of hyperthyroidism the pancreatic secretion is lessened, and we have the tendency to increased sugar formation and glycosuria; on the other hand, after thyroidectomy, glycosuria is extremely hard to produce. The secretion of the hypophysis apparently has an analogous action to that of the thyroid gland, as it has been found that in cases of tumor of the hypophysis with destruction of the gland there is a tolerance for extremely large amounts of carbohydrate. The suprarenals, whose secretion stimulates sugar formation, are under the control of the sympathetic nervous system. The glycosuria produced by stimulation (puncture) of the medulla, and formerly considered to be due to stimulation of the liver from the central nervous system, is now considered to be the result of stimulation of the suprarenals through the sympathetic system with resulting hypersecretion, which, in turn, stimulates the liver to increased sugar production. The stimulation is carried by the left sympathetic nerve to the left suprarenal, from which, by connecting nerves, it is forwarded to the right gland. If the left suprarenal is cut off from the left sympathetic nerve, no increase of sugar production follows puncture of the medulla, but separation of the right sympathetic is without influence. A number of toxic agents act in a similar way, either by stimulation of the “sugar” centre in the medulla, or by stimulating the suprarenals or the sympathetic nerve, producing a glycosuria. These relationships

¹ Med. Klinik, 1911, vii, 1.

is the explanation offered by Van Noorden to account for the marked influence of the central nervous system on diabetic glycosuria, and show why special care should be given to each case and how important it is to avoid toxic agents, and such nervous influences as emotional stress, in the treatment of the disease.

Antitryptic Properties of the Blood. This question, which we referred to in some detail last year, was studied further by Neisser and Koenigsfeld.¹ In their work, the serum plate method was used. They found the antitryptic content of the blood in diabetes to be lower than the normal, which they believe in all probability is due to an increase of the tryptic strength, resulting from the increase in the amount of sugar in the blood.

Stomach Functions. Gilbride² examined the gastric contents from 7 cases of diabetes, giving, in all, 22 test meals. As increased gastric mobility was quite constantly present, he found it necessary to remove the test meal at the end of twenty to thirty minutes instead of the usual forty-five minutes. The total acidity varied considerably, being quite high in 3 cases, which also showed a high content in free hydrochloric acid. On the other hand, free hydrochloric acid was lacking in 3 cases. By means of the Mett method, the pepsin secretion was determined. This was quite constantly low, averaging less than 2 mm. In only one case was there a normal digestion present which measured 4.1 mm.

Acidosis. The important subject of acidosis was discussed in such a thorough and careful manner by Magnus-Levy³ that we have practically limited our discussion of this subject to his address. The term *acidosis* means the *accumulation* of acids in the body in sharp distinction to the *formation* of acids. In the normal processes of metabolism, acids and alkaline substances are being constantly formed, but are neutralized and excreted. The accumulation of acids, then, presupposes a lowering or disturbance in their oxidation, but whether or not there is any increase in their formation is an entirely different question and must be answered in individual cases. As a matter of fact, the only acid of importance in the production of an acidosis is the beta-oxybutyric acid, as it is extremely doubtful whether lactic acid can ever accumulate in sufficient quantities to produce an acid intoxication. As acetone and diacetic acids are formed from beta-oxybutyric acid, the term *acetonuria* may be used as a synonym for acidosis, but it is to be remembered that acetone does not occur in the blood but is formed from the self disintegration of the diacetic acid in the urine. These acetone bodies are temporarily formed in a number of conditions, and, in general, are eliminated when carbohydrates are lacking in the

¹ Zeit. f. klin. Med., 1911, lxxii, 411.

² Journal of American Medical Association, 1911, lvi, 497.

³ Johns Hopkins Hospital Bulletin, February, 1911, p. 46.

organism or when the carbohydrate is not utilized in the normal manner. Thus we obtain the acetonuria of starvation, gastro-enteritis, cachexia, and diabetes. Except in the case of diabetes, acidosis is not a threatening symptom, and even persons with severe diabetes and acidosis have lived for years under favorable conditions. The human organism defends itself from the accumulation of acids by forming ammonia for their neutralization; 6 to 8 grams will neutralize from 40 to 50 grams of beta-oxybutyric acid, and it is only when the accumulation reaches three or four times this amount that *fatal* acid poisoning occurs. The difference between acidosis and fatal acid poisoning (coma diabeticum) is a quantitative one. Four objections have been raised to the generally accepted view advanced by Stadleman, that "coma diabeticum" is a fatal acid poisoning. (1) The alkaline treatment is relatively inefficient in comparison with its absolute efficiency in experimental acid poisoning. Levy thinks that calculation of the quantity formed and forming in man show that the quantities of alkali used have been insufficient. (2) A rather technical chemical objection based on the amount of negative and positive ions of the blood and tissues. (3) Two clinical objections have been urged; the presence of a comatose state encountered in diabetes without acidosis, and the presence of a dyspneic coma in non-diabetic cases. As regards the latter—the question as to whether or not fatal acid poisoning is a condition specific to diabetes cannot be answered at the present time. From a chemical standpoint, the only thing of especial interest in connection with the acetone bodies were the views regarding the formation of acetone bodies from proteins. The proteins are by no means to be considered as a unit, as it is probable that some of the component parts tend to increase the degree of acidosis, while others act in an opposite manner. This is due to the convertibility of certain amino-acids into sugar and the non-convertibility of others. Some dietetic and therapeutic questions are discussed in the concluding portion of the paper. Attention is called to the idea, which Magnus-Levy considers erroneous, that increased fat consumption means increased decomposition. A surplus of fat in the diet does not raise oxidation, and the ingestion of increased quantities of fat does not increase the formation of acetone bodies. Butter may be an exception to this because of its chemical composition (richness in glycerids of butyric acid). A high intake of protein, on the other hand, may increase the acidosis in an indirect way, by lowering the oxidation powers which are concerned with the combustion of the acetone bodies, by utilizing them in the burning up of the complex protein bodies. *Alcohol* and sugar are the only materials which do not yield acetone bodies, and hence we find alcohol to be the only foodstuff which acts beneficially in the diabetic acidosis. Sugar, of course, exerts the strongest antiketonic effect, as from 50 to 80 grams is sufficient to dissipate a marked acidosis

produced by starvation. Bicarbonate of soda is the great drug in the treatment of acidosis. It has no action in diminishing their formation, nor does it favor their combustion, but by neutralizing the acids it facilitates their elimination and thus withdraws them from the necessity of oxidation.

Detection and Estimation of Glucose. S. R. Benedict¹ has recently revised the method for the estimation of glucose in the urine which he published several years ago, and which has found quite widespread use. His method, like the old Fehling test, depends upon the reduction of copper, but the strong alkali (KOH) is replaced by a weaker salt. In his original method the carbonate of soda was used, which gave a reaction ten times as delicate as the original test, and such substances as chloroform, uric acid, creatinin, etc., did not interfere with the delicacy of the test. This method had one fault in common with Fehling's solution—rapid deterioration after mixing. Subsequent experimentation has shown that if Rochelle salt be replaced by potassium or sodium citrate a mixture is obtained which will last indefinitely. The formula is as follows:

	Gm. or c.c.
Copper sulphate (pure crystallized)	17.3
Sodium or potassium citrate	173.0
Sodium carbonate (crystallized)	200.0
Distilled water ad	1000.0

(The carbonate and citrate are dissolved in about 700 c.c. of water with the aid of heat, and the mixture poured in a large beaker. The copper is dissolved in about 100 c.c. of water and poured slowly and with constant stirring into the first solution. The mixture is then cooled and diluted to 1 liter.)

It may be kept indefinitely in uncolored or cork-stoppered bottles. For use, 5 c.c. of the reagent is placed in a test-tube and from 8 to 10 drops (not more) of the urine added. Heat to boiling for two minutes and allow to cool. If glucose is present, the entire body of the solution is filled with a precipitate, which may be red, yellow, or greenish in tinge. If the amount of glucose is small, the precipitate forms only on cooling. If no sugar is present, the solution remains clear or shows a faint blue turbidity.

By modifying the solution it has been made applicable for quantitative methods, and by comparisons with Allihn's gravimetric and polariscopic methods, it has been found in all probability to be more exact than any other titration method available. In this method the copper is precipitated as white cuprous sulphocyanate, which is an aid in determining when the blue color of the copper solution has entirely disappeared. The formula is as follows:

¹ Journal of American Medical Association, 1911, p. 1193.

	Gm. or c.c.
Copper sulphate (c. p. cryst.)	18.0
Sodium carbonate (cryst.)	200.0
Sodium or potassium citrate	200.0
Potassium sulphocyanate	125.0
Five per cent. potassium ferrocyanid	5.0
Distilled water to make	1000.0

(With the aid of heat dissolve the carbonate, citrate and sulphocyanate in about 800 c.c. of water. Add, with constant stirring, the copper which has been dissolved in 100 c.c. of the water. Add the ferrocyanid and after cooling dilute to exactly 1 liter.)

25 c.c. of the solution are reduced by 0.050 grams of glucose.

TITRATION METHOD. 10 c.c. of urine are diluted to 100 c.c. and poured up to the zero mark in a 50 c.c. burette. 25 c.c. of the reagent are measured by a pipette into a porcelain evaporating dish (25 to 30 cm. in diameter); 10 to 20 gm. of crystallized sodium carbonate are added, together with a small quantity of powdered talcum, and the mixture heated over a free flame until the carbonate has entirely dissolved. The urine is now run in rapidly from the burette until a chalk white precipitate begins to form and the blue color to disappear, when the urine is added a few drops at a time until the last trace of the blue color has completely disappeared. The solution must be kept boiling throughout the process, distilled water may be added from time to time if the mixture becomes too concentrated through loss by evaporation.

The calculation of the percentage is simple. The 25 c.c. of copper are reduced by exactly 50 milligrams of sugar and, therefore, the volume run out of the burette contains 0.05 gram of glucose. $\frac{0.05}{x} \times 1 =$ per cent. in original sample, wherein x is the number of cubic centimeters of the diluted urine required to reduce 25 c.c. of the copper solution.

If the urine has been preserved by chloroform, this must first be removed by boiling a sample for a few minutes and then diluting to the original volume.

Diabetes and Pregnancy. The relationship between diabetes and pregnancy was discussed by Ehret,¹ who finds two conditions of association. It is possible to have a true diabetes complicated by pregnancy, and secondly, there is a much rarer condition in which sugar appears in the urine during the period of pregnancy. This is called by the German clinicians "Schwangerschaft's diabetes," or the diabetes of pregnancy. He gives the history of a primipara, aged twenty-nine years, who, although negative on many previous examinations, developed a glycosuria of from 65 to 75 grams daily. This "diabetes of pregnancy" is influenced by the amount of carbohydrate in the food,

¹ Münch. med. Woch., 1911, lviii, 891.

and on restricted diet the excretion fell to 6 to 8 grams daily with 50 grams in the diet. Six months after delivery the patient showed a tolerance for 500 grams of carbohydrate in the form of white bread. Experimental ingestion of excessive amounts of sweets, champagne, etc., produced a trace of sugar in the urine. The question then arises as to whether or not in this case he was dealing with a true diabetes, and not with a special type due to pregnancy, as the case history might lead one to think. The disappearance of the glycosuria coincident with the termination of pregnancy does not prove pregnancy to be the cause, and Ehret is inclined to believe he was dealing with one of the intermittent types described by Naunyn. It is shown by this case that the prognosis of both mother and child is not as unsatisfactory as some writers would indicate, and that the induction of abortion or premature labor is not necessarily indicated. It is possible that repeated exacerbations of lowered sugar tolerance may establish a permanent glycosuria, and hence careful dietetic precautions must be used in future pregnancies in similar cases.

Surgical Aspects of Diabetes. The question of amputation for diabetic gangrene is quite thoroughly discussed by Morton,¹ who as a whole favors operation, but thinks each case must be considered by itself before a decision is reached. When the area is small and is not spreading, a thorough removal of the slough is indicated rather than an amputation. In cases with a spreading gangrene, accompanied by pyrexia due to septic infection, or in cases in which great pain is associated, the best results are, as a rule, obtained by amputation. He has found that in these cases the use of a spinal anesthetic gives the best result, and insists on extra care being taken to obtain aseptic conditions. He cites 3 cases in which amputation through the knee-joint, for spreading gangrene of the toes and foot, was performed. In all of these, spinal anesthesia was used, and most excellent and satisfactory results were obtained.

Herzfeld² has found sodium perborate to be of marked effect in the local treatment of diabetic gangrene, and cites 3 cases which showed quite striking improvement.

Diabetes in a Family. A most curious and interesting account of 5 fatal cases of diabetes in a family, occurring in the children from the ages of four to fourteen years, is reported by Langaker.³ Four of these cases occurred in the course of four years. The family in which it occurred was of Swedish extraction, living in Norway. The father and mother are living and in excellent health, and neither parent has ever shown the faintest traces of sugar in the urine. The family history and ancestral history is free from tuberculosis, mental disease, and specific

¹ Medical Press and Circular, London, February 28, 1911.

² Journal of the American Medical Association, 1911, lvii, 1613.

³ Deut. med. Woch., February 2, 1911, p. 217.

history, as well as any history of glycosuria. In all, there have been eight children in the family. In 1881, the first child died of diphtheria at the age of twenty months. In 1897, a four-year-old boy was found to have diabetes and died a few months later. Except for measles two years before, he had otherwise been healthy. This child died in a hospital where an autopsy was performed without, however, any demonstrable lesions being found. Two years later (1899) a second child, aged four years, likewise died of diabetes. This child was said to have had "brain fever" when a year old, but had been otherwise healthy. No autopsy. Near the close of the same year an older sister, aged eleven years, was found to have a glycosuria and died ten months later, having failed to respond to treatment. During the next year (1901) another four-year-old child was found to have diabetes and died in coma diabeticum. Thus, within four years, four children died of diabetes, leaving but a two-year-old boy. At the age of five (1904) this one contracted diphtheria, but was otherwise healthy until 1906, when he was seven years of age. At this time he was first seen by a physician, four days before his death, in coma. The urine showed quantities of sugar acetone. At autopsy no lesions were found. There are still two children living—the seventh and eighth, aged seven and five years, respectively, and who, at the present time (1910), are apparently in normal health. The cause and the relationship between the cases is unexplainable, but the condition is decidedly interesting and unique.

Treatment. **DIETETIC.** The essential treatment of a case of diabetes is dietetic, and, according to Foster,¹ the great difficulty lies in the average ignorance of food values on the part of the physician. As he aptly remarks: "The secret of treatment is the individual treatment, the adaptation of methods to the peculiarities of each case. There is no diet adapted to all . . ." Most diabetic patients demand, in a short time, some variation in the monotony of a rigid diet, and the excellent tables which we quote below were prepared by Foster for the purpose of obtaining variety and at the same time controlling the carbohydrate ingestion. Tables A and B contain food which is nearly carbohydrate-free, while Table C, which is exceedingly valuable, is to be used when the patient's tolerance has been determined, as it shows the amount of various foodstuffs equivalent to a definite quantity of ordinary white bread. When the patient's tolerance for white bread is say 60 grams, not more than 50 grams in equivalents should be given, as, for instance, 100 grams of hominy.

¹ American Journal of the Medical Sciences, February, 1911, p. 167.

TABLE A.

Fresh Meats: All muscle parts of beef, veal, pork, lamb, mutton, domestic and wild fowl, either roasted, boiled, or broiled in their juices, with butter, or with mayonnaise made without flour, either hot or cold.

Various Organs of Animals: Tongue, heart, brains, sweetbreads, kidneys, marrow, calves' liver, liver of game or poultry (pate de fois gras) up to 100 grams in weight, weighed after being prepared.

Preserved Meat: Smoked meat, dried meat, smoked or pickled tongue, ham, or bacon, corned beef, sausage (containing no bread). Be sure that no flour is used in preparing pickled meats.

Meat peptones of all kinds, jellies, or as pies prepared from calves' feet, or pure gelatin; nutrose, trepon, plasmon, wheat gluten, etc.

Fresh Fish: All fresh fish, boiled, fried, or broiled. If the fish is fried in bread crumbs and eggs, the crust should be removed before the fish is eaten. All sauces that contain no flour are allowed; those that contain butter and lemon are the best.

Preserved Fish: Dried, salted, and smoked, such as haddock, cod, herring, mackerel, flounder, sturgeon, eels, salmon, etc. Pickled herrings, sardines in oil, mackerel in oil, anchovy, tunnyfish, etc.

Fish Products: Caviar, cod-liver oil.

Shell Fish and Crustacea: Oysters, clams, and other shell fish, lobsters, crabs, crawfish, shrimps, turtle, etc.

TABLE B.¹

Foods Rich in Fats: Dairy products—cream, butter, yolks of eggs, cheese.

Animal Fats: Bone marrow, fat of edible meats, lard, tallow (used in cooking), cod-liver oil, oleomargarine.

Vegetable Fats: Olive oil, cottonseed oil, peanut oil, peanut butter, nut butter.

Vegetables containing a slight amount of carbohydrates (less than 4 per cent.). These may be taken in normal quantities unless otherwise directed: Asparagus, 2 per cent.; beet greens, 3.2 per cent.; Brussels sprouts, 3.4 per cent.; cabbage, 4.8 per cent.; celery, 3.3 per cent.; chard, 3.4 per cent.; cucumbers, 3.1 per cent.; endive, 2.2 per cent.; lettuce, 2.9 per cent.; sauerkraut, 3.8 per cent.; spinach, 2.8 per cent.; string beans, 1.9 per cent.; tomatoes (fresh), 3.9 per cent.

¹ These tables are based on the composition of foods as given in Bulletin 28, United States Department of Agriculture, and on the Nahrungsmittel Table of Schall and Heisler.

TABLE C—FOODS CONTAINING CARBOHYDRATE AND TO BE USED ONLY IN RESTRICTED QUANTITY.

	Grams.	Grams.	Grams.	Grams.
	10	20	30	50
White bread				
	Equivalent to	Equivalent to	Equivalent to	Equivalent to
Corn bread	12	24	35	60
Graham bread	10	20	30	50
Gluten bread	13	26	39	65
Oat cakes	25	50	75	125
Wheat flour	8	16	24	40
Hominy (boiled)	20	38	50	
Rice (boiled)	14	28	42	
Tapioca (pudding)	15	30	45	
Macaroni (cooked)	30	60	90	
Spaghetti (cooked)	30	60	90	
Cocoa (unsweetened)	12			

Vegetables:

Asparagus (cooked)	175	350 ¹	
Beans, red kidney	25	50	
Beans, lima	25	50	
Beets (cooked)	55	100	
Cabbage (raw)	78	156	
Carrots	60	120	
Celery (raw)	100	200	
Corn (green or canned)	25	50	
Cauliflower (raw)	80	160	
Dandelion greens	50	100	
Eggplant (cooked)	90	180	
Onions (boiled)	90	180	
Peas, green (cooked)	30	60	90
Parsnips (raw)	40	80	
Potato (boiled)	25	50	75

Fruits:

Apples (raw)	35	70	
Apricots (stewed)	40	80	
Bananas	25	50	
Blackberries (fresh)	35	70	
Cherries (fresh)	25	50	
Currants (fresh)	40	80	
Grape fruit	200		
Gooseberries	75	150	
Oranges	30	60	
Peaches	50	100	
Pears	40	80	
Plums	27	54	
Prunes (stewed)	25	50	
Raspberries	42	84	
Strawberries	60	120	

¹ When no equivalent amount is mentioned in the third column, it is to be understood that the amount given in the second column is the maximum allowable.

TABLE D.

This table consists of a list of food materials which are not entirely free of sugar. They are allowed in quantities stated unless the patient is on a "carbohydrate-free" diet, when they must be avoided.

Vegetables (cooked without flour or sweetening): Dried peas and beans, either whole or in puree, turnips, carrots, salsify, green peas, lima beans, kidney beans, 2 tablespoonfuls.

Fresh Fruit: Apples, pears, apricots, peaches, 50 grams. Raspberries, strawberries, red currants, 1 large tablespoonful. Blackberries, 2 tablespoonfuls.

Stewed Fruit (with saccharin or crystalline): Plums, apples, pears, apricots, peaches, sour cherries, prunes, 1 heaped teaspoonful. Raspberries, goose berries, red currants, 2 heaped tablespoonfuls.

Dried Fruit: Plums, apricots, peaches, apples, prunes, 2 heaped tablespoonfuls.

Lerulose Chocolate (Stollwerck's) up to 15 grams. Cocoa (without sugar) up to 12 grams.

HOW TO MAKE USE OF TABLE C.

The food is divided into two parts: (1) That which is free from carbohydrates, the principal fare, Tables A and B, and (2) that which contains carbohydrates, the secondary fare, Tables C and D. For instance, 75 grams of wheat bread are allowed in courses from Table C.

Breakfast: Principal fare, medium strong coffee or tea, cold meat, 1 egg and butter; secondary fare, 50 grams of oat cakes, the equivalent of which = 20 grams of wheat bread.

Second Breakfast: Two eggs in any form.

Dinner (mid-day meal): Principal fare, broth with egg, meat with green vegetables (Table B), cheese and butter. Secondary fare, 50 grams of potatoes (= 20 grams of wheat bread), 60 grams of strawberries (= 10 grams of wheat bread).

Afternoon Meal: Tea, coffee, or consomme, with casoid cakes.

Supper: Principal fare, plenty of hot or cold meat, with vegetables or salad, cheese and butter; secondary fare, 25 grams of Graham bread (= 25 grams of wheat bread). Total = 75 grams of wheat bread.

Foster considers the oatmeal diet, which we have discussed in detail in previous issues, to be by all odds the best method of treating acidosis. He is an advocate of five meals a day for the diabetic in place of the usual three. Space does not permit us to include any of the four pages of recipes for cooking foods for the diabetic. Many of them are most excellent, and will be found of great help by anyone who is having difficulty in holding a diabetic to a strict diet because of the monotony of the foods permitted.

Another series of tables of foods and food values were published by Carter,¹ and will be found of use to those interested in this phase of the subject.

PANCREATIC EXTRACTS. Ever since it was shown that extirpation of the pancreas in animals was followed by hyperglycemia and glycosuria, many attempts have been made to obtain an extract of the gland which would be of service from a therapeutic standpoint—the theory

¹ Medical Record, 1911, April 22.

being that in diabetes there was an insufficiency of some internal secretion which was essential in carbohydrate metabolism. Although many attempts have been made and numbers of extracts and commercial preparations have been placed on the market for both purposes of injection and alimentation, they have never been followed by favorable and constant results. Most observers have failed to obtain any effect, while a few have reported occasional favorable results. This has been one of the strongest objections to the theory of an internal pancreatic secretion, as such extracts have been obtained from other organs which have negated the effect of extirpation (*e. g.*, thyroid). We referred last year to the unsuccessful results of Forschbach, and more recently Lesche¹ has likewise obtained even more unsatisfactory results. His investigations showed that if pancreatic extracts from the frog be injected into normal and depancreatized animals, there was even a toxic influence on the animal, in addition to the extract having no action upon the glycosuria. Hedon,² who has done considerable experimental work upon the subject, has recently published a report of some investigations which are of considerable interest in connection with the subject. He has held to the view that in order to prove the presence of an internal pancreatic secretion, it must be shown that some product obtained from the pancreas is able to check an experimental diabetes produced by extirpation. His work has been mainly of a negative character, but more recently some investigations, which are briefly as follows, gave more positive results. A portion of pancreas was inserted into the circulation of a diabetic dog. When the carotid and jugular were used, it was without effect, but, when the splenic circulation was used, the glycosuria was at once reduced—returning again when the circulation was interrupted. Thus it was necessary to place the normal pancreas in the portal circulation to have any effect in reducing the glycosuria. Likewise, the blood of a normal animal injected into the mesenteric vein of one that has been made diabetic has an influence in reducing the sugar, but is of no influence if injected into the general circulation. These experiments point to an influence of some pancreatic secretion on the liver and are the first to show the influence of such an excretion upon an established diabetes. Likewise, it is possible that we may here find an explanation of the negative results which have almost uniformly followed the administration of pancreatic extracts.

OAT MEAL DIET. Although the value of the oatmeal diet in diabetes has been settled for several years, the rationale of this method has never been satisfactorily explained. In the limitation of animal proteins and in the use of but one kind of carbohydrate lies a part of the explanation, but comparative investigations, when other carbohydrates, as rice, potato, wheat, etc., are used under the same conditions

¹ Arch. f. Anat. u. Physiol., 1911, p. 401.

² Compt. rend. Soc. biol., 1911, p. 124.

and in the same manner as oatmeal, show that the same results are not obtained as when oatmeal is used. Therefore, some specific action has been attributed to oatmeal. Several theories have been offered to explain this peculiar action. Some think that oatmeal contains some substance that has a specific action on carbohydrate metabolism of the liver, others that the carbohydrate of oatmeal has a different relation in the metabolism than the carbohydrate of other substances. Another view is that it lessens the permeability of the kidney for sugar. Naunyn's explanation is that the oatmeal produces large quantities of fermentative substances which are absorbed and utilized in the metabolism. A recent view by Klotz¹ is a combination of these last two explanations. Baumgarten and Grund² have recently taken up the subject and taken the position that it is necessary to determine the action of the various constituents of oatmeal, in order to ascertain whether or not this "specific" action can be localized to any one substance, before the *modus operandi* can be determined. They used, in their experiments, preparations of oatmeal, starch from oatmeal, and the residue after the removal of starch. Fourteen cases of various degrees of severity were tested with the different preparations. It was found that their results were not parallel, but, as a whole, the most satisfactory results were obtained when the whole preparation (oatmeal) was given.

MEDICINAL TREATMENT. Among the numerous articles on dietetic treatment, Forchheimer³ discusses the questions of medicinal treatment in diabetes—a subject of which we hear little at the present day. He considers two types of cases in which a medical treatment may be of value. It may be of service in cases where the glycosuria cannot be sufficiently reduced by dietetic treatment, and likewise in a group—15 to 20 per cent. in Forchheimer's experience—who will not hold themselves to a strict diet. Treatment may be either directed against the cause—if suspected—or may be symptomatic in character. Thus we may suspect arteriosclerosis, cirrhosis of the liver, gastro-intestinal disease or central nervous lesions, and direct the treatment against them. (How is not indicated, except in syphilis when the author notes that he has never seen any effect of mercury or the iodides upon the diabetes.) The treatment, therefore, must be mainly symptomatic in character, and it is of interest to note that, as a rule, the author has never found a permanent improvement following drugs; that is to say, there is no increased tolerance for carbohydrate produced, as usually follows a dietetic treatment. The various drugs in more or less general use are then discussed. Opium is the only drug that is generally accepted as of service, and the crude drug acts better than any of its alkaloids.

¹ *Zeit. f. exper. Path. u. Therap.*, viii, 601.

² *Deut. Arch. f. klin. Med.*, 1911, civ, 168.

³ *American of the Journal Medical Sciences*, 1911, cxli, 167.

It may be exhibited in 0.03 gram doses three times a day, increasing gradually to 0.5 gram doses. The objections to its use are many. It has been noted that apparently beneficial effects may disappear while it is being taken, or that, if once discontinued and again prescribed, the second exhibition may be without effect. Another danger is, of course, the opium habit. Forchheimer prefers arsenic, in the form of Fowler's solution, rather than opium for ordinary cases. This he gives in ascending doses until mild toxic effects are produced. It should always be combined with a diet. (This holds for all "drug" treatments.) Hexamethylamine is a drug which is frequently of value, especially in cases where a regulation of the diet is impossible. Its manner of action is unknown, but it apparently reduced the glycosuria and increases the carbohydrate tolerance. Belladonna, which was condemned as worthless years ago, has recently been advocated by Rudish,¹ and Forchheimer likewise finds it of service. It is probably best adapted to cases where the glycosuria and acidosis have diminished, and where the carbohydrate tolerance has increased. It is best given in the form of atropine methylbromide, beginning with $\frac{2}{15}$ grain doses, three times a day, and increasing $\frac{1}{15}$ grain daily until $\frac{8}{15}$ of a grain is reached. Atropine sulphate should be started at $\frac{1}{150}$ of a grain, three times daily, and increased to $\frac{1}{20}$ grain. Forchheimer states that the results are about the same with belladonna, atropine sulphate, or atropine methylbromide as long as a reliable preparation is obtained. This is rather difficult, and probably accounts for many of the failures when this drug is used. Concerning the effects and use of mineral waters, Forchheimer believes that the good results obtained at the various springs are largely due to the diabetic regime and change of environment, but that the waters do play some role in the improvement which usually follows such a course of treatment. He considers the effects or non-effects of bottled waters as inconclusive, and thinks there are differences in the ions of natural and artificial mineral waters. He has observed that both mild and severe cases of diabetes improve at Carlsbad, despite the widespread statement that severe cases do not improve. In the treatment of acidosis and diabetic coma, he urges an early administration of sodium bicarbonate. The presence of acetone or increased ammonia excretion serves as an indication. Forchheimer urges the early administration of sodium bicarbonate, as he has never seen a patient recover from true diabetic coma when it has been thoroughly established. A rather bizarre suggestion is that of Ballint,² who recommends the use of sugar solution by proctolysis in cases of acidosis. If this is combined with hunger days, the result is more striking in lowering the acidosis; 100 to 150 grams of sugar are given, and Ballint thinks this is probably absorbed directly into the circulation without

¹ See PROGRESSIVE MEDICINE, 1911.

² Berl. klin. Woch., 1911, xlviii, 1562.

passing through the portal system, and hence in some way utilization is better.

SYNTHETIC CARBOHYDRATE. Rosenfelt¹ has reported the experimental use in dogs and in man of a synthetic carbohydrate called "lacton," which is intended to replace or supplement the other carbohydrates in the diabetic dietary. He claims for the preparation that it does not increase the glycosuria, but in many cases produced a reduction which makes it possible to intensify a vigorous limitation. It has no antiketogenic action. It has a pleasant, sweetish taste and is given in tea in quantities of 10 to 30 grams—in periods of two or three days, with intervals of the same duration.

GENERAL CONSIDERATIONS. In a general discussion of treatment, Hodgson² considers that there are four objective points: (1) To free the blood and tissues from sugar as nearly as it is possible to do so. (2) To find and increase the individual patient's tolerance for carbohydrate. (3) To find a diet that will furnish sufficient calories without increasing the sugar intake. (4) To prevent the usual constipation which accompanies diabetes. In the treatment of a case, it is essential to have the coöperation of the patient, and the patient should be made to realize that a disease which has been a long time developing cannot be cured immediately. As far as drugs are concerned, Hodgson considers them valueless, and in fact often of harm. In a diet, the quantity as well as the quality of the food is important, and should be restricted as much as possible. At first the diet should consist mainly of fat and protein. If constipation develops, a mixture of olive oil, castor oil, and glycerin, in equal parts, emulsified in a small quantity of gum arabic, is serviceable. As regards work and exercise, he is epigrammatic: "The diabetic should be kept mentally indolent and physically active." Fatigue, however, is to be avoided. He considers the various gluten breads on the market as practically valueless, and gives the proportions of a flour which he has used for several years, and which can be made up in the form of small cakes or biscuits and then dried:

Unground poppy seed	3 lbs.
Ground nuts (almonds, pecans, filberts, and English walnuts) . .	8 lbs.
Eggs	12
Flour of dried spinach	1 lb.
Salt to flavor.	
Milk to make a stiff batter.	

Hodgson takes the view (which is usually correct) that the diabetic is mentally unbalanced on the subject of eating, it being necessary to watch him as carefully as the morphine habitue undergoing an antinarcotic treatment. In cases of diabetes occurring in children, it is essential to place them in charge of some disinterested person. He

¹ Berl. klin. Woch., xlviii, 1313.

² Loc. cit.

summarizes the following points as essential to the successful treatment of a case:

1. To impress on the patient that, after his apparent recovery, continued care in eating is essential to continued health.
2. To rely almost entirely on diet and hygiene.
3. To restrict the quantity as well as the quality of the food.
4. To overcome constipation by the use of castor and olive oils.
5. To insist on thorough mastication of food.
6. To restrict carbohydrate to the smallest limits consistent with safety.
7. To add starches gradually, and but in one form, until the point of tolerance is reached.
8. To eliminate from the diet foods found to be difficult of digestion regardless of the unobjectionableness of the starch content.
9. To, above all, impress the patient with the fact that the disease is essentially the result of vicious dietetic habits, and that it is useless to expect favorable results as long as these habits are persisted in.

OBESITY

In the study and treatment of obesity, the classification advanced by v. Noorden is almost universally recognized to be of value. He divided obesity into two main types: (1) Exogenous, in which the condition results either from overeating or from underexercise, or from a combination of the two; and (2) endogenous, in which the obesity arises presumably from some fault in the internal secretions. The first type of case usually responds readily to dietary and hygienic regime; the second, as a rule, does not, although these may show improvement with thyroid extract. The glands that play a role in the causation of obesity of the second type are preëminently the thyroid and hypophysis. Perhaps the pineal, thymus, adrenals, and pancreas may also be of importance.¹ The ovaries and testicles, contrary to the formerly prevailing view, appear to exert no direct influence on obesity. Luthje made repeated metabolism studies on dogs at intervals up to a year after castration without being able to note any alteration in metabolism from the castration.² Leopold and Levi have considered the question from the clinical side in a study of cases of congenital or acquired amenorrhea and obesity, of oöphorectomy and obesity, of testicular atrophy or cryptorchidism and obesity, and in none of these groups could they note any constant relation between altered function, atrophy or absence of the sexual glands and obesity. In cases where amenorrhea and obesity chanced to be associated, they found often one

¹ *Rev. d. hyg. et de med. infant.*, 1911, x, 241. *Zeit. f. ärzt. Fortbild.*, 1911, viii, 134.

² Quoted by Rozenreed, v. 15.

condition relieved by treatment while the other remained unaffected. They attribute some cases with apparent association between alterations in sexual activity and obesity to a coincident change in the individual's general habits of life, thus referring the obesity to exogenous factors.

The diagnosis of the type of obesity is to be made from the history, from the detection of other signs of hypothyroidism or of dyspituitarism, and by therapeutic test. In cases of exogenous type, the history of overeating, of excessive consumption of fluid, or of insufficient exercise can usually be elicited; on the other hand, cases of endogenous obesity may actually show loss of appetite¹ in spite of increasing weight. All cases should be tried on strict dietary and hygienic regime for at least two weeks; if then, in spite of a diet of only 15 to 20 calories per kilo of body weight per day (7 to 9 calories per pound), there is no loss of weight, or if, in spite of only a limited loss of weight, marked weakness develops, the case is probably of endogenous type and thyroid or other medicinal treatment should be tried.² Stern³ has noted many cases of the endogenous type in girls at about the age of puberty but he cautions against the use of very low caloric diets in the young, never giving less than 30 calories per kilo of body weight per day (14 calories per pound), and instituting no treatment unless the weight is more than 30 per cent above normal.

Treatment. Each year new *dietary regimes* are advanced, there being almost as many dietaries as writers on obesity. Moritz,⁴ using a regime based on that of Karell, places the patient for several weeks on whole milk, giving it five times a day, usually boiled, but sometimes raw or soured. The quantity of milk given each day is 25 c.c. per kilo of normal body weight ($\frac{1}{3}$ oz. per pound) and the normal weight is estimated as follows: Height in centimeters—100 = normal weight in kilos., (or $5\frac{1}{2}$ times height in inches—220 = normal weight in pounds.) Additional water is allowed only if very thirsty. The daily loss of weight should be from a quarter to half a pound. Moritz recommends the diet especially when there are cardiac or renal complications, as in such cases, palpitation and cardiac dilatation rapidly disappear with this treatment. He insists upon diminished activity, but not upon absolute rest in bed during the treatment. Constipation, headache, and backache are occasionally noted. The constipation is met with phenolphthalein or other cathartic. The method has been objected to by some, since the analyses of Moritz, Hedinger, Umber, and Jacob⁵ have shown a daily loss of nitrogen of from 0.85 gram to 3 grams, or, in one case of Jacob's, of as much as 5.2 grams. The Rosenfeld

¹ Zeit. f. ärzt. Fortbild., 1911, viii, 134.

² Jour. de Physiotherapie, 1911, ix, 329.

³ Berl. klin. Woch., 1910, xlvii, 1414.

⁴ Quoted Albu, v, *infra*.

⁵ Deut. Arch. f. klin. Med., 1911, ciii, 124.

diet, on the other hand, has been shown by Richter, also by Jacob, to keep the patient, as a rule, in nitrogen equilibrium. This diet is taken in seven small meals, at two hour intervals, and consists each day of lean meat three times, one egg or a little cheese, a green vegetable twice, a little fruit, a slice of dry bread twice, and mashed potato three times.

Albu¹ has recommended a *diet*, mostly of vegetables, including also, however, egg, cheese, and milk, and has published detailed menus for eight midday and as many evening meals and one breakfast, so that the patient can enjoy considerable variety while following the regime. He secures a loss of from 10 to 20 pounds in from 4 to 6 weeks on this diet and has found his patients free from hunger, weakness, headache, etc. It is contraindicated, however, in cases with intestinal catarrh or atony, and in hyperchlorhydria, because of the large amount of indigestible cellulose.

For lessening the appetite, Sternberg² recommends commencing the meal with sweetened coffee or chocolate, the sweetening recommended being mannite, which is laxative. Reiss recommends abstention from salt in the food in order to favor the water output from the body. Wagner³ notes that the excessive ingestion of fluid may in itself lead to obesity.

Hot baths and *hot sand baths* are advocated by v. Bergmann.⁴ Robin⁵ uses electric light baths continued for two minutes after sweating begins and followed by a brief plunge into water at 77° to 95°. Exercise when possible, massage, and faradization⁶ are all important, but exercise is to be used with care during any stringent dietary restriction and also cautiously in elderly cases, or in those showing cardiac weakness.

Thyroid treatment is especially valuable in cases of endogenous origin and in those refractory to dietary regime. It is avoided by Wagner when marked weakness or cardiac irregularities are present, although slight edema he does not consider a contraindication. He continues thyroid treatment usually for from three to five weeks in combination with a low caloric diet. He finds, as a rule, that "tired eyes" is the first indication of excessive use of the drug, followed by the appearance of weakness, tremor, dizziness, ringing in the ears, dry mouth and, finally, palpitation. When such symptoms appear he stops the thyroid for from three to seven days and then resumes it. Older people bear thyroid less well and a few cases he finds completely intolerant toward the drug. Rozenraad⁷ considers thyroid contraindicated in the climacteric.

¹ Zeit. f. ärzt. Fortbild., 1911, viii, 226.

² Bull. de l'Acad. de Méd., Paris, 1911, lxxv, No. 17.

³ Wien. klin. Woch., 1910, xxiii, 388.

⁴ Berl. klin. Woch., 1910, xlvii, 629.

⁵ Clinique, Paris, 1911, vi, 87.

⁶ Bull. de l'Acad. de Méd., Paris, 1911, lxxv, No. 17

⁷ Lancet, 1910, ii, 1873.

GOUT

In the last two years, Wells,¹ Magnus-Levy,² Litchfield,³ Brugsch,⁴ and Schmidt⁵ have reviewed our knowledge of gout. Attention recently has been directed chiefly toward the purin metabolism and its relation to gout. Our knowledge has been increased concerning the structure of nucleic acid, the steps in the purin metabolism, and the chemical state of uric acid in the blood; new methods have been devised for the diagnosis of gout and at least one rather striking addition made to our methods of treatment.

Etiology. It is universally conceded that a disturbance of the purin metabolism is an essential factor in the production of gout, although there is some dispute as to what is the primary defect in this metabolism. The source of the exogenous purin is the purin of the food; the purins derived from the catabolism of the cell nuclei of the body and constituting the endogenous purin are probably, however, produced within the body by synthesis, since the continuance of the endogenous purin excretion and also of the body growth is possible on a purin-free diet (Magnus-Levy). It has been demonstrated that the purin metabolism is carried out through the agency of four groups of enzymes (Brugsch and Schittenhelm⁶): the nucleases which, from the nucleic acids split off the purin bodies, adenin and guanin; the desamidases which, by splitting off the amino groups and by oxidation, produce, from adenin and guanin, hypoxanthin and xanthin; the oxidases which oxidize these to uric acid; and the uricolytic enzymes which oxidize uric acid to carbon dioxide and ammonia through one or more intermediate stages. From studies of the distribution of these enzymes in the various organs it would appear that each group contains different enzymes for the different substances to be acted upon; for example, one desamidase for adenin, another for guanin. The nucleases and desamidases have been found in almost all the organs studied, and in certain of the digestive juices (Levene⁷). The oxidases are present in many organs. The uricolytic enzymes have been demonstrated in the mammalian kidney and liver, but as yet have not been demonstrated in human organs; however, Schittenhelm has shown that the feeding of nucleic acid to man increases not only the output of uric acid, but also of urea, whence he assumes the existence in man too of a uricolytic

¹ Purin Metabolism, International Clinic, 1910, i, 76.

² Uric Acid in Gout, American Journal of the Medical Sciences, 1910, cxl, 625.

³ Journal American Medical Association, 1911, lvii, 1335.

⁴ Diätetik inn. Krankheiten, Berlin, 1911.

⁵ Diag. u. Therap. der Gicht, Münch. med. Woch., 1911, lviii, 1764.

⁶ Nucleinstoffwechsel u. seine Störungen, Jena, 1910.

⁷ Journal of Biological Chemistry, 1911, ix, 375, 389.

enzyme. Unquestionably, however, from 50 per cent. (Brugsch) to 90 per cent. (Umber¹) of the purins in the body are excreted through the urine as uric acid, with traces of hypoxanthin and xanthin. The uric acid in the blood in health, on a purin-free diet, does not exceed 4 to 6 milligrams per 100 c.c. of blood, and has been shown by Gudzent² to exist, not as was once thought as the quadriurate but as the biurate of sodium, or as it is now called, monosodium urate. Gudzent has further shown that this salt of uric acid occurs in two isomeric forms; when first produced it is in the laktam form, unstable, but soluble in blood serum to the extent of 18.4 milligrams per 100 c.c. of blood; this, after an interval of time, passes into the stable or laktim form, which is only soluble in blood serum to the extent of 8 milligrams per 100 c.c. of blood. This is probably of importance in explaining the deposition of uric acid in the tissues. In the gouty, the alterations which are supposed, by the various observers, to exist in the metabolism above outlined are as follows:

1. A slow formation of uric acid from nucleic acids. (Brugsch and Schittenhelm.) (Faulty action of the nucleases, desamidases, and oxidases.)

2. Slow destruction of the uric acid. (Brugsch and Schittenhelm.) (Faulty action of the uricolytic enzyme.)

3. Delayed excretion of the uric acid by the kidney. (Explanation uncertain.)

4. Resulting gradual accumulation of monosodium urate in the blood, often to more than 8 milligrams per 100 c.c.

5. Prolonged retention of the monosodium urate in the blood, permitting it to pass to the laktim state, with a resulting decrease in solubility and consequent deposition in the tissues (Hypothetical).

The existence of (1) has been brought forward by Brugsch and Schittenhelm who find that, on feeding excessive purins to a gouty individual, the excess of uric acid in the blood develops only after a delay. The importance of (3) has been emphasized by Magnus-Levy and by Umber. Umber³ has injected uric acid intravenously in normal and in gouty individuals, and finds that the excretion is greatly delayed in the gouty cases, thus opposing the earlier contrary results of Brugsch and Schittenhelm, who made their injections not intravenously but intramuscularly. Umber believes the retention is due to a tendency of the body tissues to fix the uric acid. It has been especially noted that this diminished and delayed excretion of uric acid occurs in the absence of any trace of nephritis, and cannot be attributed to a primary nephritis in the sense of Garrod. Its cause is not yet determined. In lead poisoning, however, according to Brugsch, a true renal gout often

¹ Zur Harnsäure Retention bei der Gicht. Verhandt. d. deut. Kong. f. inn. Med., 1910, xxvii, 436.

² Zeit. f. physiol. Chem., ix, 38.

³ Loc. cit.

occurs resulting from the kidney lesions. Increase of uric acid in the blood is found in three other diseases: pneumonia, chronic interstitial nephritis, and myelogenous leukemia. The amount is especially high in leukemia due to the destruction of great numbers of myelocytes and the associated liberation of much nucleic acid. However, since there is no delay in the catabolism and excretion of this uric acid, Brugsch believes this sodium urate does not remain long enough in the blood to pass into the less soluble laktim form and be precipitated. Immediately before and immediately after the gouty attack there is, as a rule, especially low excretion of uric acid in the urine. During the attack, however, this excretion is high, often higher than normal. Two views are current regarding the attack: One that it represents a period of hypersaturation of the blood with urate and of rapid deposition of the urate in the affected joint (Garrod); the other that it represents a period of absorption from the joint of urate that has been gradually deposited there, this reabsorption giving rise to the inflammation of the lymphatics leading from the joint and to the increased excretion of uric acid in the urine during the attack (Pfeiffer). The evidence is not yet sufficient to settle this question.

Diagnosis. In the diagnosis of gout, three methods have been found of the greatest value:

1. The quantitative estimation of the urate in the blood serum.
2. The quantitative estimation of the uric acid in the urine, first on purin-free diet and then after the addition of purin to the diet.
3. The Röntgen ray examination of the gouty joints.

1. Until recently the estimation of the urate in the blood has required from 100 to 150 c.c. of blood, rendering this examination, in the majority of cases, impossible. In 1910, however, Roethlisberger¹ devised a method which is simple and may force to be accurate. It requires only 10 to 15 drops of blood taken from the ear in a glass tube as for the Widal test, the serum being permitted to separate. Then in a dimly lighted room, preferably with a red light, a specially prepared silver nitrate paper is moistened with sodium carbonate solution, thus generating silver carbonate. On to this, one drop of the serum is allowed to fall. After a proper washing in water and in dilute ammonia, the silver is found to have been reduced by the drop of serum in a degree proportional to the quantity of uric acid in the serum. This reduction gives rise to a spot varying in color from pale red to brownish-black. By comparing the color of the spot with a special color scale, the quantity of uric acid in milligrams per 100 c.c. of blood may be read. Within the limits of uric acid concentration ordinarily met with in human blood, he claims differences of 1 milligram per 100 c.c. can be detected.

¹ Klin. method f. Harnsäure inn. Blutserum, Münch. med. Woch., 1910, lvii, 344 and 2355.

Roethlisberger made comparative tests, using this method and Folin and Schaffer's method with large quantities of blood and has found the correspondence exceedingly close. The method requires only ordinary care and absolute cleanliness. At the suggestion of Schmidt,¹ Embden and Engel made comparative tests of this method and of the Folin-Schaffer method on normal and gouty individuals and on ox serum to which known quantities of uric acid had been added. All the experiments appear to confirm the accuracy of the method.

The importance of the blood examination has been shown by His,² who has thus demonstrated the gouty origin of certain obscure myalgias, sciaticas, migraines, and asthmas, and by Krückmann³ who has similarly demonstrated certain cases of ocular inflammation to be gouty. Wick⁴ has demonstrated, by examination of the joints, one case of apparent chronic rheumatism and one of arthritis deformans to be gouty.

2. In the gouty between the attacks, the uric acid excretion on a purin-free diet, which, in the normal individual, averages 0.4 to 0.6 gram daily, rarely reaching 0.4 gram. Moreover, when to a purin-free diet in a normal individual some purin food is added, the excretion of this added purin is prompt, and is completed within two days; on the other hand, the gouty individual shows a delayed excretion of such added purin, the increased elimination of uric acid continuing for from three to five days. Occasional cases, such as one case reported by Magnus-Levy,⁵ proved by *x*-ray demonstration of uratic joint deposits to be actual gout, fail to show this characteristic disturbance of uric acid excretion.

For measuring the uric acid in the urine, Schmidt finds that the purinometer of Walker-Hall, which depends upon the precipitation of the uric acid with a silver solution and the reading of the volume of the settled precipitate at the end of twenty-four hours from graduations on the tube, gives results sufficiently accurate for clinical purposes and is simpler than the much surer Folin-Schaffer or Salkowski methods. The reliability of the method, however, is not yet settled.

3. The value of the *x*-rays in diagnosis is again emphasized by Umber, Schmidt, and Magnus-Levy. Deposits of urate in the joints show as dark areas in the plate, being less opaque to the rays than are bone salts. Aside from these deposits, the gouty joint is typically quite free from changes. These deposits are most frequent in the first metatarsophalangeal joints and in the phalangeal joints of the fingers. This is a valuable method for distinguishing the gouty joint from the joints of chronic rheumatism or arthritis deformans.

¹ Loc. cit.

² Radium in Gicht, Berl. klin. Woch., 1911, xlviii, No. 5.

³ Oculäre Gichtanfälligkeit, Med. Klin., 1910, vi, No. 38.

⁴ Pathogen. d. Gicht, Wien. med. Woch., 1911, lxi, 1349, 1424 and 1486.

⁵ Diag. d. Gicht v. Purinstoffwechsel., Deut. med. Woch., 1911, xxxvii, No. 17.

Treatment. A treatment attracting considerable interest today is that by *radium emanations*. Gudzent has shown, in test-tube experiments, that the emanations from radium salts maintain monosodium urate for a much longer time in its soluble state and eventually cause its decomposition into CO₂ and ammonia. Fofanow¹ produced urate tophi under the skin of two series of rabbits by local injection of sodium urate. One series of rabbits was then subjected to the influence of radium emanations in a lead chamber supplied with oxygen that had been caused to pass through a solution of 1 mg. of radium chloride. The other series served as controls and were not given any emanations. The sites of injection were then examined at varying periods. He found that those getting the radium emanations showed less reactive leukocytic infiltration but more absorption of the urate.

Experiment.	Treated with radium per cent. absorbed.	Control per cent. absorbed.
I	13.4	7.5
II	9.7	7.6
III	6.6	0.5

His² tried the effects of the radium treatment on 28 gouty patients. After a period of treatment, 24 of these showed marked improvement, 4 showed none. Urinalyses, in 2 cases, showed increased output of uric acid during the period of emanation treatment. The clinical improvement was not always associated with a diminution in the uricemia. Gudzent and Lowenthal³ have noted a beneficial influence from this treatment, and Gudzent⁴ has studied the comparative merits of administration of the emanation by injection of radium salts, by administering by the mouth water saturated with radium emanation, by baths in emanation-containing waters, and by placing the patient for two hours in a Lowenthal chamber supplied with air that has been passed through a solution of radium salts and therefore contains some of the emanation. His conclusions are based upon an examination of the blood of the patients for its content of emanation, which he finds to be greatest when the Lowenthal respiration chamber has been used. After the patient leaves the chamber, the blood loses its emanation content within a few hours. Gudzent, in 7 cases treated with emanation, found in 4 an increased, in 2 a lowered, and in 1 an unaltered output of uric acid. In very elderly, severe cases, the radium treatment is, according to Schmidt, contraindicated, since the treatment is apt in such cases to excite an attack which may be serious; it is also costly and cannot replace other measures, such as dietary restrictions. Brugsch emphasizes the value of a purin-free diet, but insists that it

¹ Zeit. f. klin. Med., Berlin, lxxi, No. 17.

² Loc. cit.

³ Loc. cit.

⁴ Zeit. f. klin. Med., 1911, lxxiii.

may be necessary to continue it for months in order to get results. He quotes Schmidt and Bessan's¹ analyses to show that a vegetable diet is not necessarily a purin-free diet. Their analyses show that spinach, fresh peas, and beans, some of the grains, mushrooms, and peppers contain purins in amounts quite comparable to the meats. Also that the smaller fish, such as sardines and anchovies, also oysters, crabs, and lobsters are rich in purin bodies. Taylor² pointed out, in 1899, the possibility of giving much purin in a purely vegetable diet.

The purin bodies of coffee, tea, and chocolate are for the most part methyl purins and as such do not pass through the catabolism followed by other purins, and are probably not detrimental in the same way; however, since some part of their purins, according to Schittenhelm,³ is transformed into uric acid, Brugsch recommends the use of caffeine-free coffee. He advocates supplying 15 to 20 per cent. of the nutrition from eggs, milk, and cheese, the remainder from butter, cream, bacon, honey, compotes, vegetable soups, potatoes, rice, carrots, cauliflower, and bread.

Both v. Noorden⁴ and Umber⁵ advocate the determination of the purin tolerance of each individual by giving, after several days on purin-free diet, a definite quantity of meat and noting how promptly the individual eliminates this purin. V. Noorden then permits as much purin daily as the patient has demonstrated himself capable of caring for; while Umber, according to the delay in excretion, introduces from 1 to 6 purin fast-days each week to allow complete cleansing of the system. This he continues for years. Since uric acid retention is greatest at night, he advocates giving what purin is permitted early in the day. Reed and Wallace⁶ have recently published cases showing the value of this determination of purin metabolism and giving in detail their procedure which is based on that of v. Noorden.

Cohn⁷ finds that by feeding to rabbits a food rich in potassium, such as rice, or by the injection of potassium salts, he greatly favors the absorption of subcutaneously injected uric acid, whereas the injection of sodium salts hinders the absorption. He therefore advocates the avoidance of foods rich in sodium, such as foods containing blood, and the utilization of foods rich in potassium, such as potato and rice. Medication with acids or with potassium salts he considers beneficial, since both tend to remove sodium from the body. Schittenhelm,⁸ basing his opinion in part on experimental work, believes that alcohol is inju-

¹ *Therap. Monatsheft.*, Berlin, 1910, xxiv, No. 3.

² *American Journal of the Medical Sciences*, 1899, n. s., cxviii, 141. ³ *Ibid.*

⁴ *Berl. klin. Woch.*, 1905, 1297.

⁵ *Therap. d. Gegenwart*, Berlin, 1911, I, 73.

⁶ *Disorders of Purin Metabolism*, Journal American Medical Association, 1912, lviii, 20.

⁷ *Deut. med. Woch.*, 1911, xxxvii, 455.

⁸ *Loc. cit.*

rious, and particularly so when taken with meals. It appears to retard purin metabolism. Lemonade and carbonated waters are permissible. Schmidt strongly advocates the use of Falkenstein's hydrochloric acid treatment in those cases which have been shown by test-meal to have a subacidity. He uses from 12 to 20 gtt. of concentrated hydrochloric acid, well diluted, daily with the meals. This would be equivalent to from 40 to 70 gtt., of ac. hydrochlor. dilut. U. S. P. daily. Falkenstein uses three times this dose. The acid administration is, according to Falkenstein, to be continued throughout the patient's life. Recently Falkenstein has advocated the administration of a mild iodide preparation for a few weeks each year. Foster¹ has shown that piperazin and quinic acid are only test-tube solvents of uric acid and are valueless clinically, and Brugsch, v. Noorden, Schmidt, Falkenstein, Umber, and Cohn, basing their opinion on such experimental results as those of v. Loghem on animals, and of Pfeiffer on man, advocate strict avoidance of all alkalies. The best drugs are colchicum, the salicylates, the iodides, and hydrochloric acid. The value of exercise is universally acknowledged. In the attack, Brugsch recommends a mild laxative, such as rhubarb or senna, and a soft diet.

EXOPHTHALMIC GOITRE

A great many reports on exophthalmic goitre have appeared during the last year; and while some advance has been made in our knowledge of the disease, many problems still await complete solution.

Terminology. There seems to have been no advance made in the choice of a proper designation for the disease. The old term, which we still use at the head of this article, is as popular as any; and yet, as a descriptive term, it is far from complete. The other names—Basedow's disease, Graves' disease, etc.—are not satisfactory, and not generally accepted in the different countries. The term hyperthyroidism, at one time thought to properly characterize the condition, is coming to be used more for the milder or incomplete forms, and, moreover, is criticised by some investigators on the ground that the disease is not simply the result of an *increased* functioning of the gland, as this term implies. After all, the choice of a satisfactory name must await a more complete and thorough knowledge of the exact nature of the malady; and this, in turn, will be preceded by a better understanding of the physiology of the thyroid than we now possess.

Frequency. Few statistics have appeared indicating the frequency of this disease in relation to other conditions. McPhedran² states that exophthalmic goitre occurs with only moderate frequency in Canada.

¹ Yale Medical Journal, 1911, No. 5.

² Canadian Medical Association Journal, February, 1911.

In the Toronto General Hospital, during the five years ending December 31, 1909, there were only 55 cases of the disease out of a total admission of 8489 medical cases; that is, 0.65 per cent. In the last 4000 cases of the Montreal General Hospital, there were 23 cases of exophthalmic goitre, or 0.575 per cent, making nearly the same percentage in the two groups of cases.

Sex. It is generally agreed that exophthalmic goitre is more frequent in the female sex. Along this line, the report of Pic and Bounamon² is particularly interesting. They report 2 cases of the disease in male adults, and state that, in looking through the literature, they found reports of 563 cases, of which 109, or less than 20 per cent., were in men. All authors seem to agree that the affection usually has a stormy onset, and runs a more serious course in men than in women.

Etiology. During the last year there seems to have been an effort to get at the factors to account for the change in the action of the thyroid, which, in turn, brings about the disease. A rather new explanation of the action of shock or fatigue, worry or fright in the etiology of exophthalmic goitre is put forth by Crile.² He states that the primary emotions—fear, anger, and sexual love—rest on the same principle, *viz.*, self-preservation and procreation. Under the influence of fear, most of the organs of the body are sharply divided into two classes—those that are stimulated and those that are inhibited. The organs and tissues stimulated are precisely those that are actually utilized in the perception of danger and in a physical struggle for self-preservation; while the systems inhibited are those that do not participate in this struggle.

There is considerable evidence that the effect of the stimulus of fear upon the body without physical activity is more injurious than the effect of fear with physical activity.

Man is capable of only such actions as his ancestors have, through evolution or phylogeny, made possible, and only by association. When, therefore, he receives a stimulus that in his phylogeny would have led to action, but in him no action ensues, though there is a widespread stimulation in preparation for action—this is emotion.

Now, whatever the exciting cause of exophthalmic goitre, the symptoms are alike, and closely resemble the phenomena of one of the great primitive emotions. The thyroid gland is believed to participate in such physical activities.

Fear and Graves' disease have the following phenomena in common: Increased heart-beat, increased respiration, rising temperature, muscular tremors, protruding eyes, loss of weight. Cannon has found an increased amount of adrenalin in the blood in fear, and Fränkel, in Graves' disease, increased blood pressure, muscular weakness; digestive

¹ *Revue de Méd.*, June, 1911.

² *Bulletin of Medical and Chirurgical Faculty of Maryland*, July, 1911.

disturbances, impaired nervous control, hypersusceptibility to stimuli. In protracted, intense fear, the brain cells show marked physical changes; in Graves' disease there seems to be a composite picture of an intense expression of the great primitive emotions. The thyroid gland plays a leading role in keeping up this stimulation of the emotions, as evidenced by the effect of diminishing the activity of the gland or of the administration of the extract.

IODINE. It has been known for some time that the administration of iodine to individuals with exophthalmic goitre is apt to aggravate the condition, and also that the use of the drug in the treatment of simple goitre is sometimes followed by the appearance of exophthalmic symptoms. The report, therefore, of Goldflam¹ is of particular interest in calling attention to the danger of the use of iodine in conditions other than those affecting the thyroid. He reports 2 cases. In the first case, symptoms of serous meningitis had existed for some months, when a course of iodipin was started, and was soon followed by tachycardia, enlargement of the thyroid, and tremor of the fingers. In the second case, a man, aged thirty-four years, who had been symptomatically treated for syphilis for several years after infection, developed incipient tabes. With subcutaneous injections of iodipin, considerable improvement resulted; when, suddenly, symptoms of exophthalmic goitre developed and became very distressing, particularly the severe diarrhea, emaciation, and weakness. The symptoms finally completely subsided after the drug had been stopped. In such cases as these, the iodine seems to exert a specifically injurious action on the thyroid, which sometimes persists after suspension and elimination of the drug. This may occur, whether the thyroid is perceptibly enlarged or not, and does not seem to be restricted alone to regions where goitre is prevalent.

Wolfsohn² reports the case of a woman, aged forty-two years, to whom potassium iodide had been given in the treatment for leg ulcer, because of a possible syphilitic factor in the lesion. The day after the iodide was begun, the patient complained of enlargement of the neck, malaise, and tremor of the eyelids, tongue and fingers, with an increase in the pulse rate to 128. These symptoms all disappeared with suspension of the iodide. Three months later, the ulcer was dressed with vioform, a powder containing iodine, and in half an hour the entire leg burned and itched. A little later the neck became enlarged, an erythema developed, with tremor; both sides of the thyroid were found enlarged, but not tender. In another case, a woman, aged thirty-two years, with a tendency to goitre and nervousness, developed Basedow's symptoms after a course of iodides and thyroid tablets. The symptoms persisted after the treatment, and have gradually increased during the five

¹ Berl. klin. Woch., March 6, 1911.

² Deut. med. Woch., February 2, 1911.

years since. These cases suggest the necessity for more careful supervision of patients taking iodine, whether there is manifest goitre or not, as even minimal amounts of iodine are liable to induce signs of severe thyroid intoxication.

CONSTIPATION. The toxic effect of putrefactive substances from the intestine on the thyroid has been held by some investigators as a very direct cause—or, at least, an aggravating factor—in the etiology of exophthalmic goitre. Ebstein¹ emphasizes again the very close relationship of these two conditions, in the report of four cases. All were in women between the ages of eighteen and forty-seven years, in whom the constipation was very obstinate, and yielded only to persevering injections of oil. In one of the cases all the symptoms of exophthalmic goitre subsided completely, and in the others there was marked improvement, with no recurrence during the fifteen years since. He is convinced that autointoxication from chronic constipation is liable to have an injurious influence on the thyroid; and when the source of these toxins is removed by the cure of the constipation, the disturbances resulting from the pathological thyroid functioning are liable to subside with it.

PREGNANCY. The relation of the thyroid and ovarian function has been a subject for study for some years. The relation of pregnancy to the production of exophthalmic goitre has been the next step in this study. White,² in a critical review of the literature of the subject, states that all writers seem to agree that swelling of the thyroid gland is common during pregnancy, and that this may persist after delivery. Some authorities (Nicholson) attempt to explain this as an effort on the part of the body to combat the toxemia of pregnancy. With the exception of Williams, most writers regard pregnancy as a potent factor in the etiology of exophthalmic goitre.

While there seems to be some disagreement as to whether the symptoms entirely disappear after pregnancy, all seem to lean to the opinion that they are worse during the course of the pregnancy. In some cases, symptoms of exophthalmic goitre appear during the toxemia of pregnancy.

Hertzler³ reports 12 cases illustrating the relation of pelvic disease to exophthalmic goitre, and sums up his ideas as follows:

“1. That there is some relation of the thyroid gland and the pelvic organs is generally recognized.

“2. Exophthalmic goitre and pelvic lesions frequently coexist. In such instances, the pelvic lesion existed before the advent of the hyperthyroidism. Secondary genital atrophy may be the beginning of the terminal stage of myxedema.

¹ *Therapeut. Monatsch.*, December, 1911, xxiv, No. 12.

² *Journal Obstetrics and Gynecology of the British Empire*, September, 1911.

³ *Journal of American Medical Association*, December 23, 1911.

"3. The relief of the pelvic lesion is, in certain cases, followed by the amelioration of the exophthalmic goitre.

"4. It seems highly probable that, in certain instances, the pelvic lesion stands in a causal relationship to the exophthalmic goitre.

"5. The possibility that reflex irritation may exert an influence in producing an increased or perverted secretion of the thyroid makes it desirable that, when the diagnosis of exophthalmic goitre is made, search should be made for some possible source of irritation. The physiological relationship between the thyroid and the pelvic organs suggests that the latter are particularly liable to be the source of such irritation and deserve especial attention."

TUBERCULOSIS. Bialokur¹ calls attention to the presence of Basedow's symptoms in patients with tuberculosis. He noted the combination in 27 of 337 patients with pulmonary tuberculosis in 1908, and in 28 in 1909. He remarks that the Basedow's symptoms in these cases may be overlooked or ascribed to the tuberculous infection. That the relation is not a causal one is shown by the benefit that follows treatment directed against the exophthalmic syndrome. As this subsides, the pulmonary symptoms improve, and the patient may be clinically cured. There is probably a vicious circle, the tuberculous toxin exerting an injurious influence on the thyroid, stimulating it to increased secretion; and this secretion may increase the virulence of the tubercle bacilli, which, in turn, may arouse latent processes into active lesions. In his experience, every patient with exophthalmic goitre was already tuberculous. The changes in the lungs in these patients are of different kinds, and there may be great destruction; but, as a whole, the lesions are not the most malignant. Obstinate diarrhea is the rule; the thyroid is not much enlarged, and pronounced exophthalmos is rare. The patients are gloomy and despairing, instead of hopeful, as is common with tuberculous subjects. There is commonly a tendency to sweats, and the temperature is usually subfebrile. It is difficult to find tubercle bacilli in the sputum; so that the trouble is usually regarded as bronchitis, rather than as tuberculosis. The overwhelming majority of the patients were women. Pregnancies recurred with remarkably brief intervals; the sexual instinct was strong, and the menses abnormally frequent and profuse.

In the ten typical cases described in detail, besides the usual strychnine, arsenic, and iron treatment, he exposed the thyroid to the Röntgen rays or had it removed.

Pathology. During the last few years, some progress has been made in the knowledge of this disease by a more careful and detailed pathological study of the glands removed at operation or autopsy, and of the relation of the symptoms and signs to the changes found.

¹ Zeit. f. Tuberculose, 1910, xvi, p. 557.

Noteworthy along this line is the work of Marine and Lenhart¹ at the Lakeside Hospital, in Cleveland, Ohio. They made a very careful study of 69 cases of clinically diagnosed exophthalmic goitre, with the aim of getting at the basic factors in the etiology of the disease. Their study of the pathology of the disease is so complete that it will be discussed at some length. They grouped the glands found in these patients in the following scheme:

1. Normal thyroids.
2. Hyperplasias.
 - I. Primary, *i. e.*, developing on a normal gland basis.
 - A. Developmental stage.
 - B. Involutional stage.
 - C. Atrophic stage.
 - II. Secondary, *i. e.*, developing on a colloid gland basis.
 - A. Developmental stage.
 - B. Involutional stage.
 - C. Atrophic stage.
3. Colloid glands.
4. Adenomata.
 - I. Simple.
 - II. Fetal.
5. Old complicated goitres.

Five cases were found with normal or normal colloid glands. This may be accounted for by the fact that thyroid hyperplasia may have been prevented by an unusually high iodine-content in the glands, or the symptom-complex of each case may have been a form of nervous symptom-complex closely related to exophthalmic goitre.

Forty-three cases were included under the *active hyperplasias*. Here the changes noted were, briefly: An increased blood supply in the gland; the disappearance of the normal colloid, and its replacement by a granular albuminous debris, in which were many leukocytes and epithelial cells; the change of the epithelial cells from the low colloidal to the high cuboidal, columnar, and high columnar; the increase in the size of the gland, and the decrease in its consistency; the enlargement of the follicles by budding, infolding, and plication; and the connective tissue hyperplasia, all making up the developmental stage.

The second stage, the involutionary, recovery, or colloidal stage, usually alternates in the gland with the one just described, in response to outside conditions. The gland becomes firmer; the blood supply diminishes; the follicles become more distinct and filled with colloid, at first staining poorly, but later intensely, and resembling normal colloid; the high columnar epithelium returns to the low cuboidal; and the gland becomes smaller.

¹ Archives of Internal Medicine, September 15, 1911.

The exhaustion, premature atrophy, or myxedematous stage is the result of the death of the cells by exhaustion, and their replacement with fibrous tissue. The gland becomes smaller and firmer; it remains quite vascular, with capsule thickened; the stroma is increased, and compresses the follicles; colloid is absent; the epithelial cells become irregular in size, shape, and staining reactions, and lose their arrangement in follicles.

In the *secondary hyperplasias*, the same changes are described. Here the process is apt to be less regular, and to be complicated by cyst formation, hemorrhages, degenerations, or tumors of the gland substance.

Colloid goitre is the nearest to the normal state, anatomically, to which hyperplastic thyroids may return. These glands are characterized by a decreased blood supply as compared with the active hyperplastic type; an accumulation of normal colloid in enlarged follicles; and a return of the follicular epithelium to the normal cuboidal form.

Adenomata probably have little to do in the production of the exophthalmic syndrome. The remainder of the tissue, however, may show changes productive of symptoms.

The changes in the *thymus*, *spleen*, and *lymph glands* are as constant as are those in the thyroid. The same changes, however, are seen in many other conditions than exophthalmic goitre; such as status lymphaticus, cretinism, myxedema, acromegaly, etc. The hyperplasia of the thymus varies with the age of the patient, with the duration and severity of the disease, and with some other still unknown factor. There are no distinctive features about it in this disease. The spleen is usually enlarged, due to hyperplasia and generalized fibrosis. The lymph glands and lymphatic accumulations in various organs of the body are generally increased.

The *nervous system* shows nothing definite. The changes may be those of finer cell nutrition, which still baffles our present means of investigation.

The *circulatory system*. The heart is hypertrophied, more or less, in proportion to the hyperplastic thyroid. The venous radicles leading from the thyroid to the superior vena cavæ are dilated, and the arteries from the carotid to the thyroid are enlarged. With decrease in the size of the thyroid there is a decrease in the size of the vessels, with the development of endarterial thickening.

The *skeletal muscles* show a fatty metamorphosis, atrophy of the fibers, and a loss of striation, resembling the changes seen in progressive muscular dystrophy.

The *bones* show decalcification, increased vascularity of the periosteum, and widening of the Haversian canals.

The *liver* may show varying degrees of portal cirrhosis.

The *blood* usually shows a chlorotic anemia, with the total leukocyte

count very little altered. There is a decrease in the number of polymorphonuclears, with increase in that of the lymphocytes and mononuclear cells. There seems to be a close parallelism between the percentage of mononuclear cells in the circulating blood and the extent of the lymphoid hyperplasia; so that, while not specific for exophthalmic goitre, the percentage of mononuclear cells is a fair index of the extent of the disease.

In an attempt to bring out relations between the gland structure and the various symptoms, these investigators work out a rather new conception of the disease, which has called forth considerable discussion and criticism.

The observations concerning the relation of *thyroid iodine* to *exophthalmic goitre* have shown a marked lack of uniformity. This is due, in a large degree, to the lack of uniformity in the anatomical grouping of these glands. In the series reported, the normal glands have the highest percentage of iodine content; while the marked hyperplasias have the lowest. In those patients to whom iodine medication had been given, the iodine content was considerably raised. In four patients in whom the iodine medication had been continued for periods of from two to eighteen months, complete involution to the colloid state was present. They, therefore, state that the active hyperplasia of exophthalmic goitre has the faculty of rapidly taking up iodine, which induces a series of morphological changes identical with those occurring in spontaneous involution. They were unable to bring out any direct relation between the *pulse rate* and the *gland structure* or increased secretion. They believe that probably both cardiac activity and thyroid reaction are due to more remote general disturbance. The *temperature* seemed to be higher in the active hyperplasias, but not enough to suggest any causal relation between the gland structure and fever. *Exophthalmos* was present in 35, and absent in 34, of this series; it was, therefore, very inconstant. Its relation to hyperplasia is only very general.

Of the 69 cases, 4 showed evidences of premature or *myxedematous atrophy* supervening on hyperplasia. Thyroid insufficiency starts with the hyperplasia, and may develop rapidly. The two symptom-complexes may develop synchronously. Myxedema never precedes, but accompanies or follows exophthalmic goitre. The incidence of sex is the same in both. In both the same changes occur in the blood, in the lymphoid tissue, and in the lowered resistance to infections. The iodine relations are continuations of changes seen in hyperplasia. The essential thyroid disturbance in myxedema is a lessening in the physiological value of the secretion, and not a quantitative lessening of the same.

After a study of the pathological changes occurring in exophthalmic goitre, Simmonds¹ states that the disease has its origin and chief point

¹ Deut. med. Woch., November 22, 1911.

of attack in the thyroid gland, but is not associated with constant characteristic changes of this organ. The symptom-complex is produced by functional disturbances of the gland, and these disturbances may rest on quite different pathological conditions. Whether these conditions depend on a hypersecretion or a disturbed secretion, and also at the same time on an increased resorption, will have to be determined by chemistry and experiments.

Retrosternal Goitre. Kreuzfuchs¹ reports retrosternal goitre present in 3.7 per cent. of 1040 cases of exophthalmic goitre. This does not include those cases of evident goitre with a retrosternal portion, which make up about a third of all cases. The clinical diagnosis will finally rest upon *x-ray* examination. Examination should be directed to this type when respiratory disturbances occur without demonstrable heart or lung lesions.

Symptoms and Diagnosis. Krecke² pleads for an abandonment of the old name, "Basedow's disease," because this term corresponds only to a disease in which the disturbances caused by the thyroid are of the highest grade. Instead of this he suggests the term, "Thyreose," for which the equivalent in English would probably be "thyreosis," to designate a disease dependent on changes in the thyroid gland. The recognition of the severe forms is easy. Where there is relatively slight increase in the size of the gland, and where the other signs are only partially developed, the condition may easily be confused with diseases of other organs or systems.

According to the prominent symptom, Krecke differentiates thyreoses with predominating heart disturbance, those with more prominent changes in the nervous system, those with more profound disturbances of nutrition, and, finally, forms that resemble iodine poisoning.

In the thyreoses in which affection of the heart stands in the foreground of the symptoms, differentiation may be quite difficult from goitre heart with dilatation and hypertrophy of the right heart in consequence of breathing disturbances dependent on struma. Intrathoracic goitre, to which reference has already been made, may readily be associated with the latter condition.

Another type, with cardiac signs predominating, is the thyreosis that develops about puberty in females, and expresses itself in tachycardia, fatigue, and incapacity for work. This form is dependent on the close relationship of the thyroid and the sexual glands. The differentiation of these forms of heart thyreoses from heart failure may at times present difficulty. The diagnosis of thyreosis may be reached, however, if every cause for a primary heart affection fails, if the person is from a goitre district, and if an enlargement of the thyroid is present with thyrotoxic disturbances.

¹ Münch. med. Woch., January 3, 1911.

² Ibid., 1911, Nos. 30 and 31.

The diagnosis of nervous thyrosis should be made only in the presence of thyroid enlargement, blood changes, etc., and well-marked nervous signs. Oftentimes, the condition first makes itself manifest as a thyreosis after an aggravation of the symptoms following the use of iodine preparations.

Thyreoses with disturbances of nutrition and of the digestive system predominating are rare. The absence of other signs completing the metabolic picture, and the presence of thyroid enlargement and thyrotoxic signs, will assist in clearing up the question.

Kraus¹ calls attention to attacks of intense pain in the upper abdomen in a number of his cases. This pain, as a rule, came on suddenly, resembled gallstone colic or the crises of tabes, had no relation to the taking of food (coming on usually at night), and required large doses of morphine for its relief. There was tenderness over the celiac plexus, but none over the gall-bladder. In one patient, the attacks were associated with the typical "giving way of the leg" sign of exophthalmic goitre. After the exclusion of all other causes for the pain, it was ascribed to the action on the solar plexus of the toxin causing exophthalmic goitre. In one case, the spasmodic pain was the first symptom of trouble. This was in a man, aged fifty-two years, who was suddenly attacked with violent abdominal pain, which persisted and was so severe that he lost 21 pounds in weight in two weeks, and 54 pounds in a month. By the end of three months symptoms of exophthalmic goitre developed, including restlessness, insomnia, palpitation, and pains in the shoulders, the appetite remaining good. Antithyroidin was given him, together with hydrotherapy, and the application of the continued current to the neck. Under this regime the pains gradually subsided; but the Basedow triad has since become more marked.

Cardiovascular neuroses may simulate exophthalmic goitre, but may be differentiated from it by the absence of rapid loss of weight in the former. Hyperthyroidism may induce a condition resembling chlorosis; and during the menopause, disturbance may develop suggesting Basedow's disease. These borderline conditions deserve especial attention, as the prevailing practice of giving iodides in the prophylaxis or treatment of arteriosclerosis may induce these disturbances or aggravate a latent tendency to exophthalmic goitre.

Another sign of hyperfunctioning of the thyroid is the tendency to frequent and copious stools. This sign becomes particularly important if it follows long and continued constipation, and is associated with other signs of hyperfunctioning on the part of the thyroid.

The relation of exophthalmic goitre and chlorosis, referred to above, is discussed by Handmann,² who reports 44 cases of chlorosis, in more

¹ Med. Klinik, January 29, 1911.

² Münch. med. Woch., 1911, No. 22.

than half of which enlargement of the thyroid was present. This could not be attributed to locality, as many of his cases came from goitrous-free districts. The presence of distinct Basedow's symptoms with the thyroid enlargement was comparatively infrequent in this series, being present in only 3 cases. *Liq. ferri albuminatis*, given in all of these cases, had no effect on the thyroid affection, whether it was latent or accompanied by manifest symptoms.

Graves¹ emphasizes the confusion in ideas about exophthalmic goitre owing to the various names given to it. He also lays considerable stress on the vague and inconstant signs of early disease. He concludes his paper by stating that the early diagnosis of hyperthyroidism will be aided:

"1. By the medical mind discarding such terminology as Parry's disease, Graves' disease, Basedow's disease, and exophthalmic goitre; and substituting, in discussion and in print, the more natural term, hyperthyroidism.

"2. By remembering that so-called cardinal signs are usually late signs in the development of hyperthyroidism.

"3. By remembering that, in the beginning of hyperthyroidism, its manifestations are apt to be monosymptomatic and, during this period, the symptomatology is characterized by inconstancy and variability.

"4. By remembering that a change in the nervous and mental state is the ever-present symptom and sign of hyperthyroidism; and that this is frequently the only complaint in the beginning, and that a more intensive study of the whole individual supposed to be suffering from so-called hysteria or neurasthenia will frequently disclose other symptoms and signs of hyperthyroidism.

"5. By remembering that the fundamental source of error in the recognition of hyperthyroidism is rather in not looking than in not knowing."

Stern² calls attention to the fact that elevation of temperature is one of the early, if not the earliest, objective symptoms of hyperthyroidism. It seems to be more common in the mild than in the more pronounced types of the affection. In many cases, the mouth temperature is raised but a degree or a fraction of a degree; in others, the increase amounts to two, or even three, degrees. In some cases, the temperature fluctuates, with occasional intermissions, between 99° C., and 99.4° C., for months, or even years; in others, the slightest exertion or excitement drives it up to 99° or 100°. In many cases, the lowest temperature is recorded after a night's rest. Continued rest in bed will occasionally reduce the temperature to normal for a brief period. The usual discrepancy between the mouth and the rectal temperature does not exist in all cases; and, in many, it is only a small fraction of

¹ Journal of Missouri State Medical Association, September, 1911.

² Archives of Diagnosis, July, 1911.

a degree. This pyrexia may be easily confused with the rise in temperature seen in hysteria, and it may be that some of the conditions usually attributed to hysteria—fever, tremor, accelerated cardiac activity—are really the expression of an acute or chronic thyrotoxication. The temperature of hyperthyroidism never reaches the extreme height of hysterical fever, but is enduring for a longer period of time; while the decline of the former is rapid, that of the latter is apt to be slow. Like the fever of hysteria, however, that of hyperthyroidism may start abruptly; or, like the former, it is liable to appear or to become augmented by exertion or excitement.

Hysterical temperature may be differentiated from thyrotoxic temperature by the following three main factors, *viz.*: Hysterical fever does not, as a rule, concur with physical decline and emaciation; thyrotoxic temperature elevation usually does. The urine in instances of hysteric fever exhibits a small urea and phosphoric acid quotient; whereas, in the presence of hyperthyroidism, it is increased. Hysteric pyrexia is usually not influenced by the administration of preparations of thyroid or iodine, while these drugs are liable to produce or augment the thyrotoxic fever.

Hunt's discovery that white mice became more resistant to injections of acetonitril when fed on blood from exophthalmic patients is being used now as a practical diagnostic test for excessive functioning of the thyroid gland. Ghedini¹ used in his experiments white mice weighing 15 to 20 gm. They were fed with bread dipped in water; he found that from 4.5 to 5.5 mgm. of acetonitril per gram of body weight was the fatal dose, killing the previously untreated animal in from half an hour to three hours. The blood from the patient under examination was evaporated in a vacuum, ground, and mixed with zwieback into pills, each containing 0.2 gram of the pulverized blood. The pills were given the animals after fasting for about ten days, until each mouse had taken thus about 2 gm. of the blood powder. About 25 c.c. of blood was required to produce this amount of powder for three mice. The mice were then injected with acetonitril in the fatal dose, or 0.25 mg. more per gram of body weight. In his experiments, the animals all died when the blood had been derived from patients with affections other than those suggesting the Basedow triad, while nearly all the animals bore the injection of the acetonitril without apparent harm when the blood had come from patients with exophthalmic goitre or other signs of excessive functioning of the thyroid gland. Ghedini has found this means of differentiating the tendency to exophthalmic goitre very useful.

Holmgren² has made an interesting study of the effect of exophthalmic goitre on growth and ossification. He has reviewed 353 articles and

¹ Wien. klin. Woch., May 25, 1911.

² Nordiskt med. Arkiv., xliii, No. 182.

facts encountered in his own experience. He concludes that the thyroid does seem to control the growth of bones; and that infections, by their action on the thyroid, are able to promote the growth of bones in length, and so increase stature. In his own experience, a blonde complexion and unusual height for the age, either or both, are almost invariably accompanied with thyroid hyperfunctioning.

Kappis¹ calls attention to the paralysis of the cerebral nerves as a condition sometimes associated with exophthalmic goitre. He reports 2 cases of this disease with paralysis of the ocular muscles, and 2 in which the paralysis involved the muscles of swallowing or the soft palate. He has, moreover, compiled from the literature forty cases of paralysis of the ocular muscles, and nine of bulbar paralysis, with or without ophthalmoplegia. In these, the bulbar symptoms developed in the course of a rapid and severe Basedow's syndrome; and all the cases terminated fatally in a short time. In 5 other cases, the bulbar paralysis was less pronounced. These and other cases reviewed suggest that there must be some disturbance in one or more nuclei or fibers in the medulla oblongata, and the lack of pathologic anatomic findings is because this region has seldom been examined properly in such cases. If series of sections fail to reveal anything pathologic, then the trouble must have been a myasthenic disturbance, rather than true paralysis. The practical lesson taught by the material reviewed is that the paralysis does not develop until the exophthalmic goitre has existed for some time; if the syndrome had been cured, the paralysis would not have manifested itself.

The term thyrotoxicosis is used by some authors to refer to a mild or abortive type of exophthalmic goitre, which has come to be more generally recognized in the last few years. Starck² reports 30 cases coming under his observation. In most of the cases, the disturbances could be traced to some severe nervous shock; this started over-functioning on the part of the thyroid; and this, in turn, reacted on the nervous system, setting up a vicious circle. The symptoms of this condition resemble those seen in the complete form of the disease. Either some of the characteristic symptoms or signs may be wanting, or they may be present in mild form. The eye symptoms in these cases are the retraction of the upper lid, thus showing more of the eyeball than usual, even when there is no actual protrusion; a peculiar brilliancy of the eye; the lack of coördination in the movement of the eyeball and upper lid as the patient looks down; insufficiency of convergence; and Kocher's sign—that is, the quicker upward movement of the upper lid before the eyeball moves upward when the patient's hand is held on a level with his eye and then suddenly raised. The cardiovascular symptoms are similar to those in exophthalmic

¹ Mitteilung. aus den Grenzgeb. der Med. und Chir., February 18, 1911.

² Deut. med. Woch., November 23, 1911.

goitre, only in a mitigated form; the slightest physical or emotional stress may send the pulse rate up by twenty to thirty beats. In one case there was apparently typical angina pectoris. Severe and recurring depression is almost constant; the memory is impaired at times, and the patient is extremely irritable and restless. Inability to sleep is an early symptom. The main point in treatment is to restore tone to the nervous system; and, for this, absolute physical repose and freedom from care and mental stress are imperative. Advice, going into the minutest detail, is necessary. Dietetic measures, and possibly arsenic, may also prove useful. Digitalis does no good, unless myocarditis is present. The important factor for successful treatment is to begin it early.

Treatment. The outline of treatment as given by Marine and Lenhart¹ so well covers the general methods of attacking this disease today that it will be presented in detail.

They state that the therapeutic measures at present employed may be divided into two groups, as follows:

I. Those directed toward the correction of metabolic disturbances and, in particular, nervous exhaustion.

II. Those directed toward reducing or counteracting the thyroid secretion.

Under Group I are:

Rest—both mental and physical, as nearly absolute as possible.

Baths—for their sedative and tonic effects.

Exercise—of three forms: (1) Active (voluntary) movements, (2) passive movements, and (3) electricity.

Climate—with a cool, dry, clear atmosphere.

Diet—plain, well-cooked wholesome food, taken at regular intervals.

Suggestion—to stimulate confidence and to encourage and cheer the patient.

Drugs—only in small doses, and under careful control and on symptomatic indications.

1. Cardiovascular group as represented by digitalis and its derivatives, only for specific heart disease.

2. Sedatives, especially bromides for nervousness, restlessness, and insomnia, only after other measures fail.

3. Iron, arsenic, sodium phosphate, and quinine hydrobromide for certain special cases.

4. Animal extracts, with the exception of desiccated thyroid, have no known influence. In the use of this substance, or iodothyreoglobulin or iodine, these authors are a little at variance with some of the other investigators. They claim that any of these three substances, given in proper dose, produce (a) an involution to the colloid state, (b) an

¹ Loc. cit.

increase in the iodine content, and (c) a decrease in the blood supply of the gland. In the so-called secondary exophthalmic goitre cases, and in cases with manifestations of developing myxedema doses, of from 2 to 5 grains daily of commercial thyroid are often beneficial. In the acute, severe, primary exophthalmic goitre cases, this drug should not be employed unless one uses a purified iodothyreoglobulin hypodermatically in doses of $\frac{1}{50}$ grain, as recommended by Beebe, and then only under very close observation.

5. Iodine has much the same action in this disease with active hyperplasia as has the two substances just described, but has the advantage that the dose can be more easily controlled. It should be administered by mouth in the form of the syrup of ferrous iodide in doses of 5 minims daily, gradually increased. Syrup of hydriodic acid or sodium iodide may be used.

Group II includes those measures directed toward reducing or counteracting a theoretical hypersecretion. According to these authors, the basis for this theory of the disease is very frail.

1. Surgical measures have been discussed in a recent number of *PROGRESSIVE MEDICINE*.

2. The chief non-surgical measures are (a) the antithyroid serum of Moebius, (b) the milk of thyroidectomized goats, (c) the thyreolytic serum of Rogers and Beebe, and (d) the Röntgen rays. The value of all these measures is very variable, and none of them are followed by uniformly good results.

Ohlemann¹ follows the authors just quoted in the use of very small doses of *iodine in the treatment of exophthalmic goitre*. Its action is slow and gradual. Large doses give unpleasant effects. The great affinity of the gland for iodine suggests that the smallest possible dose will give effect. He gives 10 to 20 drops, once or twice daily, of a 20 per cent. solution of potassium iodide. Beck² reports the results of treatment of 1500 cases of exophthalmic goitre with the thyreolytic serum. He had 50 per cent. of cures and from 15 to 20 per cent. of failures.

Taylor,³ following the directions of Beebe, prepared an *antithyroid serum* which was given a trial in the treatment of several cases of exophthalmic goitre, with entirely negative results. Not only did the serum produce no change or amelioration of the symptoms or signs of the disease, but large amounts of the serum could be injected without causing any results whatever.

Dayton⁴ reports 5 cases of exophthalmic goitre treated with *thyroidectin* and gives the results of treatment with the same drug

¹ Berl. klin. Woch., February 29, 1911.

² New York Medical Journal, 1911, xciv, 73.

³ Journal of American Medical Association, January 28, 1911.

⁴ Ibid, April 22, 1911.

as reported in the literature. He also reports 2 cases treated with the milk of thyroidectomized animals. His conclusions are as follows:

The few recorded results with thyroidectin in exophthalmic goitre are, on the one hand, improvement in 100 per cent. of 36 cases reported by three writers; on the other, one unfavorable report in 12 cases, one of negative results in a single case, and general condemnation, without details, by three observers. To these he adds 5 cases, none of which gave results which were greater than the ordinary variation in symptoms in exophthalmic goitre under the influence of rest, suggestion, and regulation of habits, while in 1 case the remedy appeared to aggravate the symptoms. His two patients treated with desiccated milk of thyroidectomized animals showed extreme aggravation of symptoms in one case, apparently a direct result of the treatment, and, in the other, improvement, probably due to restriction of coffee. The results of treatment with thyroidectin seem far inferior to those secured by rest, symptomatic medical treatment, or partial thyroidectomy.

Edmunds¹ maintains that the effect of the treatment of exophthalmic goitre with the *milk of thyroidless* goats or preparations made from it depend in a large measure on the dosage. He believes that where the dried milk is used the daily dose is usually far too small. One of the preparations of dried milk in common use is so compounded that 1 ounce corresponds to about 4 ounces of whole milk. If now one dram of this be given three times daily, the three drams would correspond to about six drams or 1 ounce of whole milk. While, if the whole milk were prescribed, it is usual for the patient to take from 1 pint to 1 quart, the total yield of one goat.

Jermain² gives the results of treatment in 38 cases of hyperthyroidism which he has had under his care in the last six years; 22 of these presented the typical symptoms of the disease, while in 16 there was much evidence of thyroid intoxication, although the usual cardinal symptoms of Graves' disease were absent. Of the 38 cases, 34 were women, and 4 were men. Of the 34 women, 20 had menstrual disturbances of some kind; 11 of the 20 were women between the ages of forty and forty-eight years, suffering from what are usually regarded as disturbances of the menopause, such as palpitation, tachycardia, loss of weight, nervousness, sensation of heat or hot flashes, glistening sclera, restlessness, and insomnia. In 8 of these 11, thyroid extract was given temporarily with a view of determining the nature of the symptoms, and in every one there was a marked aggravation of symptoms. Four of the eleven were women beyond the menopause in which such symptoms as marked and rapid increase in weight, mental dulness and dry skin in association with tachycardia, struma, and exophthalmos pointed to a mixed type

¹ Lancet, December 2, 1911.

² Wisconsin Medical Journal, September, 1911.

of thyroid disorder. These 38 cases were all treated by the Forchheimer method, *viz.*, the administration of neutral quinine hydrobromide, in 5 grain doses, with ergotin in all cases in which vascular disturbances were marked, combined, if necessary, with rest and forced feeding. Cases with profuse menstrual bleeding were given calcium lactate with most gratifying results.

In the milder cases of hypersecretion, these remedies, combined with a moderate amount of rest, were sufficient to improve the conditions to such a degree that in from four to eight weeks the patients were able to resume their customary duties, practically free from annoying symptoms. Relapses occurred, but they were easily controlled by the quinine. In the severe cases, absolute mental and physical rest in bed for a considerable time is essential to the success of the treatment.

Of the 22 cases of typical Graves' disease, 4 resisted this method of treatment; 3 of these were operated upon, and subsequently, with medical treatment, made a good recovery; 1 was refused operation because of the bad condition of the heart and subsequently died; 10 of these 22 cases have been under continued observation for from two to six years. All of them have recovered sufficiently to permit them to resume their occupations.

We know little or nothing of the action of the x -ray on the histology of either the normal or pathological thyroid gland. Colloid goitre and simple goitre show no notable change after Röntgen therapy. On the other hand, in Basedow's disease Röntgen therapy often is followed by very good results. Rave¹ states that its use is followed by a decrease in the size of the gland, lessening of the Basedow's symptoms, the exophthalmos, the cardiac phenomena, tachycardia, and nervous symptoms; an improvement of the general condition and an increase in weight soon follow.

Salmon reports 2 cases of exophthalmic goitre in women, aged about forty-five years, to whom he had given systematic hyphophysis treatment. The improvement was so marked in these patients that he regards this method of treatment quite as specific as the thyroid treatment in deficient thyroid functioning.

¹ Inaug. Diss., Bonn, 1911.

OPHTHALMOLOGY

By EDWARD JACKSON, M.D.

Eye Lesions of Sporotrichosis.—These were referred to two years ago as involving the lids.¹ Since that time reported cases have largely paralleled the observations made on experimental sporotrichosis. In a case reported by Chaillous,² the primary lesion was in the upper cul-de-sac of the conjunctiva in the form of granulations which were slightly prominent and congested, but lacked the yellow spots that have previously been described. There was swelling of the lid and involvement of the glands. Morax³ saw primary involvement of the lacrymal sac causing abscess, the pus from which contained the sporotrichum. Liégard⁴ obtained the sporotrichum from the lacrymal canaliculus. Legry, Sourdelle, and Velter⁵ record a case of disseminated sporotrichosis, with gummatous lesions, involving the ciliary body. Dor⁶ encountered a corneal lesion in a child attacked with general sporotrichosis about two months after vaccination. The peculiar appearance of the cornea, presenting a yellow rounded spot like a drop of wax, and a gummatous lesion over the sternum led to a microscopic examination and a proper diagnosis. The variety of lesions that may be due to sporotrichosis, its general resemblance to syphilis, its prompt cure by potassium iodide, and tendency to persist indefinitely, if not met by this specific treatment, make it important that the disease should be borne in mind, and the necessary microscopic examination made to reach the correct diagnosis.

Ocular Lesions with Vitiligo. Cases reported by Erdmann and Komoto⁷ seem to indicate a direct relation between vitiligo and certain changes in the eye. In Komoto's case, with the appearance of patches of vitiligo on the backs of the hands and feet, the lashes became white, and vision diminished one-half, with photophobia. There were fine, dust-like opacities in the vitreous and great diminution in the pigment of the fundus, which appeared almost albinotic, with scattering of pigment dots, especially toward the posterior pole. In Erdmann's

¹ PROGRESSIVE MEDICINE, June, 1910, p. 346.

² Annales d'Oculistique, January, 1911, p. 47.

³ Ibid., p. 49.

⁴ Recueil d'Ophtalmologie, April, 1911, p. 123.

⁵ Soc. Méd. des Hôpitaux de Paris, 1911, No. 25, p. 124.

⁶ La Clinique Ophtalmologique, March, 1911, p. 121.

⁷ Klin. Monats. f. Augenh., February, 1911, pp. 129, 139.

case, the inflammatory symptoms were more marked, and the loss of pigment occurred in the region about the optic disk. There was also night-blindness. It is quite possible that a general search for them might reveal similar changes in the ocular fundus in many cases of vitiligo.

Eye Lesions from Auto-intoxication. Three cases are reported by Risley¹ characterized by severe chronic constipation, disturbance of the circulation, and chronic weakness, or nerve disturbance, in which intestinal sepsis was regarded as the cause of the eye lesions. Two patients presented neuroretinitis, which, in one, went on to optic atrophy. The third suffered from retinochoroiditis, from which he recovered with useful vision in both eyes. It is unfortunate that the underlying general condition in such cases remains indefinite. The attempt to connect it with *indicanuria* seems to have failed completely. Von Hippel,² from an examination of 416 patients with various eye diseases, found the indican reaction in only 16. Stuelp³ examined, for indicanuria, 497 patients suffering from eye diseases that had been ascribed to auto-intoxication. Indican was found in 39.

Among 511 patients suffering from eye diseases not ascribed to auto-intoxication, indican was found in 38; and among 56 persons free from eye disease, 5 showed indican; approximately 8 per cent. in each group. He concludes, from a close study of 82 cases of chronic recurring uveitis, only 7 of whom showed indican, that it must be one of the rarest causes for such diseases.

Influence of Salvarsan on the Eye. In general, the experiences recorded in the last year have confirmed the conclusions previously reached⁴ regarding the benefits and the dangers of this drug to the visual apparatus. The early, acute lesions of syphilis are cured as swiftly and completely when occurring in the eye as in any other part of the body. Frenkel⁵ reports a case of intense *iritis* in which, three days after the administration of the drug, the papules had disappeared from the iris, and the eyes resumed almost a normal appearance. But later lesions may be equally benefited. Coover⁶ saw a case of *neuroretinitis* and *vitreous opacity* in which, under treatment, including mercury iodides and sodium cacodylate, vision had fallen to light perception in each eye. Within a month after the administration of salvarsan, it rose to $\frac{6}{15}$ and $\frac{6}{7}$, and subsequently became practically normal. Even in the *parenchymatous keratitis* of inherited syphilis, when given early, it has cut short the pathological process. Sautter,⁷ and others, have reported

¹ Transactions of the American Ophthalmological Society, xii, No. 2, p. 950.

² Klin. Monats. f. Augenh., January, 1912, p. 119.

³ Graefe's Arch. f. Ophth., lxxx, p. 548.

⁴ PROGRESSIVE MEDICINE, June, 1911, p. 361.

⁵ La Clinique Ophtalmologique, October, 1911, p. 556.

⁶ Ophthalmic Record, March, 1911, p. 131.

⁷ Annals of Ophthalmology, October, 1911, p. 729.

cases of *syphilitic tarsitis* in which rapid improvement has followed its use. Sautter's patient had been under treatment for more than three months without marked permanent improvement. The lid swelling decreased and some of the lesions had almost disappeared within forty-eight hours after the use of salvarsan.

The lesions of the ocular and other cranial nerves that appear after the use of salvarsan are sufficiently common and severe to be of considerable practical importance. While the drug may have some special influence on nerve tissue, Ehrlich's explanation that the lesions are syphilitic seems to be supported by later experience. Galezowski¹ reported a case in which, with paralysis of the oculomotor and abducens nerves, there was intense *optic neuritis* with exudation into the macular region of the retina. But a complete and speedy cure was obtained by repeating the injections of salvarsan, alternated with benzoate of mercury.

DISEASES OF THE CONJUNCTIVA

Conjunctivitis Caused by Eel Blood. Four cases of severe irritation produced by the contact of eel blood with the conjunctiva have been recorded during the last year. Pöllot and Rahlson² saw a young woman who had got into her eye a couple of drops of blood from an eel dead about three-quarters of an hour. There was acute inflammation, with chemosis and swelling of the lids, subsiding within twenty-four hours. They experimented by instilling the serum into the eyes of rabbits, cats, and dogs, and Pöllot had it placed in his own conjunctiva. Local irritation was produced in all cases, except in the eyes of the dog. Investigation showed that the irritant was in one of the serum albumins, or some allied substance.

In Löhlein's³ case, the patient, seen within one-half hour after the blood got into the eye, suffered from swelling of the lids, with lachrymation and photophobia compared to that from pepper thrown into the eyes. With the corneal microscope the superficial layers of the cornea showed a slight uniform clouding like that produced by cocaine. Fluorescein produced no staining. The symptoms had subsided by the next day. Steindorff⁴ saw 2 cases in one of which the symptoms began instantly, but, in the other, a few minutes after the contamination of the conjunctiva. In one case, there was a slight haze of the cornea, and, in one, some accommodative asthenopia followed. But the acute symptoms passed off in a few days. Steindorff endeavored to produce the reaction to eel's blood in cats, rabbits, and guinea-pigs, but without

¹ Société d'Opht. de Paris, October 3, 1911.

² Graefe's Arch. f. Ophth., lxxviii, p. 183.

³ Klinische Monatsbl. f. Augenh., May and June, 1911, p. 658.

⁴ Ophthalmic Review, October, 1911, p. 319.

results. Cleansing and soothing applications to the conjunctiva seem to be the only treatment required.

Epidemic Conjunctivitis. Several epidemics of conjunctivitis have been described during the last year. Most of them were caused by the *diplobacillus* of Morax-Axenfeld. But one due to another organism described by McGowan and Taylor¹ is of especial interest. It occurred in a school of about one hundred boys from eight to fourteen years of age, 49 of whom were attacked. It began with 3 brothers who were allowed to leave school on a Saturday, one of whom was attacked the next Monday, and another a week later. Cases continued to appear for about four weeks. In 9, there was a relapse. Clinically the disease was a simple conjunctivitis, beginning in one eye and extending to the other, with hyperemia, slight discharge, photophobia, and tenderness of the eyes. The bacteriological examination of 5 cases showed a Gram-positive diplococcus; which could not be distinguished in form from the *pneumococcus*. But it differed markedly from the pneumococcus in its action on litmus milk, its fermentation of sugars, especially non-fermentation of inulin; and its production of punctate spots in serum on the sides and bottoms of the tubes, with absence of turbidity. It also differed from the pneumococcus in being non-pathogenic when injected into rabbits and mice. A good many epidemics of conjunctivitis have been described in which the organism found was supposed to be the pneumococcus. But it has usually not been subjected to any searching bacteriological tests; and such epidemics have not been associated with any other form of pneumococcic disease, even the well-known pneumococcic lesions of the cornea being absent. It seems probable that such epidemics may really be caused by this pseudo-pneumococcus.

Purulent Conjunctivitis. In a study of 70 cases of ophthalmia neonatorum, Bartels² found the gonococcus to be the cause in 58 per cent. In about one-half these cases the inflammation at its height was intense, but the organism could be found after the inflammation had subsided. In one case, it was discovered at the end of fourteen weeks. Gram-negative diplococci, other than the gonococcus were found, and in some cases the inflammation seemed to be due to bacilli resembling the diphtheria bacillus.

A case of severe purulent conjunctivitis in a girl, aged three years, is reported by Post,³ in which the ocular inflammation was preceded four days by *acute arthritis*. The conjunctival discharge showed large numbers of gonococci. Recovery was complete in about a month. The infection was ascribed to a vaginitis, the existence of which, however, was not proved.

¹ Lancet, November, 1911, p. 1324.

² Klin. Monats. f. Augenh., May and June, 1911, p. 537.

³ Transactions of the American Ophthalmological Society, xii, p. 758.

The narrow temperature range of the gonococcus is well-known. It is killed by a temperature of 108° F. Heat can be made to penetrate the tissues more deeply than chemical antiseptics, and the eye bears very hot applications well. Goldzieher¹ has reported 15 cases of acute gonorrheal conjunctivitis treated by the application of *steam*, and believes his results superior to those obtained with silver nitrate. He applied the steam through a nozzle held 4 cm. from the eye, giving a temperature of 45° C. (113° F.) at the surface of the tissues. The difficulty in the method would be to thoroughly expose all parts of the conjunctiva; and it would seem easier to overcome it by irrigation with a solution raised to the proper temperature.

Protesting against the indiscriminate use of the *organic compounds of silver* in ophthalmic practice, Theobald² points out that they cause more cases of *conjunctival argyrosis* than the nitrate. He has seen decided staining from the treatment of gonorrheal conjunctivitis with protargol, and also from argyrol used for mild chronic conjunctivitis. Wilson³ saw a case of argyrosis caused by prolonged use of a 2 per cent. solution of ichthargan.

Trachoma. Whatever the significance of the cell inclusion first described in connection with trachoma, the name "trachoma bodies" appears to be a misnomer. McKee,⁴ like other observers, has found them in eyes free from trachoma in 5 infants, 1 with catarrhal conjunctivitis, and 2 with no conjunctivitis; and in a man with a normal conjunctiva. They are much more common in conjunctival disease, especially trachoma, and it is suggested that they represent a reaction of the conjunctiva to some sort of virus. Greeff,⁵ who was one of the first to observe them, admits their occurrence in the normal conjunctiva, and more often associated with gonococci, diphtheria bacilli, pneumococci and staphylococci, and in the discharge of swine plague, but he still holds they are probably microorganisms.

The *treatment* of trachoma, however, remains of the highest practical interest. Fernandez⁶ claims that, in 600 cases treated with *sodium salicylate*, he has had only 15 failures. After rubbing the conjunctiva of the everted lids with a swab moistened with 6 per cent. of cocaine, or alypin solution, and waiting for anesthesia, he rubs the surface with another cotton swab moistened with distilled water and made to take up finely powdered sodium salicylate. The discomfort caused is rarely intense. But moderate or intense inflammatory reaction follows. Each time the conjunctiva is left more smooth, and usually in the end becomes normal.

¹ Wiener klin. Woch., November 23, 1911.

² Transactions of the American Ophthalmological Society, xii, p. 763.

³ Archives of Ophthalmology, xl, 547.

⁴ Ophthalmoscope, September, 1911, p. 618.

⁵ Transactions Heidelberg Ophthalmological Congress, 1911.

⁶ Anales de Oftalm., November, 1911, p. 177.

Five or six applications, at intervals of three or four days, are usually necessary. After instillation of an ordinary cocaine-adrenalin solution, Lea¹ punctures each granulation with a tattooing needle, dipped in *strong acetic acid*, one part; water, two parts. This is preceded and followed by washing with boric acid solution; and the patient uses mercuric cyanide, 1 to 4000, at home, daily. The pricking is practically painless, and it is repeated every third or fourth day. Lea cites typical cases cured in about four months; and one that had remained well for fifteen years. Lea has also used the acetic acid treatment with success in one case of vernal conjunctivitis. Thomson² finds that cases which are clinically trachoma, with or without pannus, often do remarkably well under the use of *protargol*. After instillation of cocaine the 20 per cent. solution of *protargol* freshly prepared, is brushed over the conjunctiva rapidly with a rather stiff throat brush, until the surface is "smothered in a soap-like lather." The eyeball may be protected by a spatula. Each patient carries his own brush. The treatment has the immense advantage of being painless, but the danger of staining the conjunctiva is not to be forgotten. The *subacetate of lead* has been used by DeMets³ for fifteen years. And in 1500 patients, averaging three applications each, he has seen not more than 10 cases of lead incrustation; and believes the danger of this accident is exaggerated. The powdered lead salt is mixed to a paste with water; and applied to the conjunctival surface, and allowed to remain in contact for one to two minutes. The excess is then thoroughly washed away with running water, until this becomes clear. The first pain is controlled by cocaine, but a marked inflammatory reaction follows. The existence of corneal ulceration contraindicates the use of any lead salt.

Vernal Conjunctivitis. Brown Pusey,⁴ examining smears from the conjunctiva stained with the Giemsa stain, found, as pointed out by Herbert, that those taken from vernal conjunctivitis were rich in eosinophile cells; while other conjunctival affections did not show this characteristic. Routine examinations of the kind revealed 13 cases of vernal conjunctivitis in about as many weeks, all but 3 of which would have been overlooked had it not been for the discovery of the eosinophiles. He also found these cells in the conjunctival secretion of patients suffering from hay fever, an additional point of resemblance between the two affections. Conjunctivitis with the presence of such cells may be provoked by pollen, and this points to a possible etiological factor for vernal conjunctivitis. Mackay⁵ reports a case of vernal conjunctivitis treated with *radium* with complete success. The treatment was

¹ Ophthalmoscope, September, 1911, p. 621.

² Ibid., March, 1911, p. 181.

³ Bull. de la Société Française d'Ophth., 1911.

⁴ Journal of the American Medical Association, April 1, 1911, p. 952; October 7, p. 1207.

⁵ Transactions of Ophthalmological Society of United Kingdom, xxxi, 217.

begun in March and three or four weeks elapsed before any improvement could be observed. After that it was slow but steady. Zentmayer¹ reports a case much improved by the use of *salicylic acid ointment*, 1 per cent.

Pemphigus involving the eyes is a very serious affection. Cases of the kind have been reported by Bouchart,² Fehr,³ and Casali,⁴ in all of which serious disability was produced. Fehr's patient was a man, aged twenty-nine years, suffering from recent severe syphilis. Salvarsan had a very beneficial effect upon his general condition, but gave no important relief to the conjunctival lesions, which went on to total ankyloblepharon for one eye, and partial adhesion, with dense pannus, in the other. Bouchart's patient was a woman, aged thirty-three years, who escaped with a few adhesions between the lid and eyeball, and good vision when the eye was shaded; although the lids were greatly scarred and the lashes destroyed. The favorable result he ascribes to massage, with an ointment of collargol. Casali's patient, a man aged fifty-four years, was treated with a 1 per cent. ointment of scarlet red; but suffered severely with conjunctival ulcerations and adhesions. Bane⁵ has reported a case, in which an eye treated with the *x*-rays recovered, and remained cured two years later. In the other eye, there were cicatricial changes and entropion.

DISEASES OF THE CORNEA

Purulent Ulcer. The treatment of corneal ulcer by *sterilization through heat* was referred to last year.⁶ Bourgeois⁷ reports favorably from eleven years' experience with a method of *sterilizing the ulcer by hot air* blown against the cornea with the apparatus used by dentists, consisting of a metal tube attached to a rubber bulb and heated by an alcohol lamp. Arens⁸ reports a favorable experience with *pyocyanase* in 41 cases of corneal ulcer. This is instilled every half hour. It especially causes rapid disappearance of hypopion.

Rosacea Keratitis. The corneal lesions seen in connection with acne rosacea is the subject of a paper by Darier,⁹ who reviews the literature of the subject and reports 3 additional cases, observed for three, nine, and twelve and one-half years. Chance¹⁰ records 3 cases. One occurred in a man who had been more or less affected for sixteen years. The

¹ Ophthalmic Record, June, 1911, p. 305.

² L'Opht. Provinciale, May, 1911.

³ Ophthalmic Review, May, 1911, p. 156.

⁴ Annali di Ottalm., xl, 481.

⁵ Ophthalmic Record, 1911, xx, 32.

⁶ PROGRESSIVE MEDICINE, June, 1911, p. 366.

⁷ American Journal of Ophthalmology, August, 1911, p. 250.

⁸ Woch. f. Therap. u. Hyg. d. Auges, July 27, 1911.

⁹ La Clinique Ophtalmologique, January, 1912, p. 2.

¹⁰ Trans. Sec. Opht. of the College of Physicians, Philadelphia, December 21, 1911.

tendency to relapse was marked in all these cases. All presented the general characteristics described last year.¹ But 3 of these 6 cases occurred in men. Chance found holocain of value in the local treatment. Darier has not resorted to it, being satisfied with the results obtained by applications of dionin, followed an hour later by light massage with an ointment of yellow oxide of mercury or of scarlet red. The permanent cure seems to depend on removing the causes of the general condition.

Preservation of Cornea for Keratoplasty. The difficulty of always procuring clear cornea for use in keratoplasty induced Magitot² to experiment on the preservation of the cornea with retained transparency. He has used rabbits' eyes, and found that when kept at a constant temperature, 6° to 8° C. (43° to 46° F.) in serum containing hemoglobin from animals of the same species, the cornea remained perfectly clear for twenty to twenty-five days, and retained completely its normal histological appearances, except that some of the nuclei of the corneal layers tended to shorten and become oval. He used corneas preserved in this way to graft upon the eyes of other rabbits and found they behaved exactly like fresh corneas so grafted. The animals thus treated were killed at various times, at the end of twenty hours to two months, and the corneas examined microscopically. The graft adhered promptly and completely, caused no leukocytosis, underwent little degenerative change, retained its own epithelium, which was, at first, thinned, but afterward resumed its normal thickness. The difference in the direction of the lamellæ indicated the point of junction between the natural and the grafted tissue, and showed that the latter had not been replaced. While keratoplasty has a very limited practical application, the preservation of vitality in such a tissue as the cornea, is a matter of general interest.

DISEASES OF THE UVEAL TRACT

Pupils. Attention is called by Adler³ to the occurrence of *transient anisocoria* with reddening and heat of the ear on the side of the dilated pupil. The condition recurs, affecting sometimes the right, sometimes the left side. He ascribes it to a functional disturbance of the symmetry of action of the sympathetic nervous system. The *symptomatic importance of anisocoria* is defended and urged by Bychowski.⁴ He is skeptical as to the accuracy of statistics showing a high percentage of unequal pupils as a congenital anomaly. He thinks that the majority of such patients, carefully examined, would show some pathological cause for the anisocoria. Mere inequality of the pupils is not sufficient

¹ PROGRESSIVE MEDICINE, June, 1911, p. 367.

² Annales d'Oculistique, July, 1911, p. 1.

³ Klin. Monatsbl. f. Augenh., June, 1911, p. 751.

⁴ Postep Okulist, 1910, Nos. 10 and 11.

basis for a diagnosis or prognosis, but should be regarded as evidence of irritation or paralysis in some related portion of the nervous system.

A form of *alternating anisocoria* is known which has lately been described under the name of "jumping pupils," or "see-saw pupils." The pupils retain the ordinary reactions, but one is more widely dilated than the other. At one time it will be the right, at another the left pupil which is the larger. The dilatation may shift from one to the other in one-half hour, and sometimes the changes back and forth occur repeatedly in the same day. This condition may accompany either organic or functional disease of the nervous system. Miloslavich¹ saw it with exaggerated tendon reflexes, and loss of cutaneous sensibility, in a soldier, aged twenty years, who was hysterical, and had suffered from head injury in childhood. Cramer² saw this condition in a healthy school-girl, aged seven years. No cause for these irregular variations was discovered, and he raises the question if they may not be purely functional.

Miosis with narrowing of the palpebral fissure, slight appearance of enophthalmos, and disturbance of circulation and secretion—the so-called syndrome of Horner—are well-known to occur from paralysis of the cervical sympathetic of the affected side. Dufour³ reports a case in which these symptoms were associated with moderate enlargement of the thyroid on the affected side. Whether this syndrome may arise from injury to the sympathetic nerve in the head has been less certain. Sicard and Galezowski⁴ think that it may, and report 3 cases sustaining their view. These patients suffered from trifacial neuralgia, on account of which they were given injections of alcohol into both the oval foramen and the round foramen. In each case marked miosis, narrowing of the palpebral fissure and apparent sinking of the eyeball, occurred on the same side. Vasomotor disturbance and disturbances of secretion were noted. Fromaget⁵ reports a case in which the syndrome, including increased secretion of tears, occurred in a patient presenting pulmonary tuberculosis in the first stage, and disease of the maxillary sinus, possibly of the same nature, all on the right side. The instillation of adrenalin in the right eye caused the pupil to dilate to the same size as the left.

Iritis. To a patient who had been suffering from pleurisy and sciatica, Bradburne⁶ was called on account of loss of sight in the left eye. The blindness had come on without pain. The lids and conjunctiva were swollen, and the cornea so hazy as almost to hide the iris. Later, as the cornea cleared, a large part of the anterior chamber was found occupied by a solid semitransparent mass, looking like camphor. The right eye

¹ Wien. klin. Rundschau, 1911, No. 1.

² Klin. Monatsbl. f. Augenh., February, 1911, p. 201.

³ Recueil d'Ophthalmologie, xxxiii, 90.

⁵ Annales d'Oculistique, cxlv, 266.

⁴ Ibid., p. 225.

⁶ Ophthalmology, vii, 175.

became involved, the pupil dilating imperfectly to atropin, and leaving a deposit of lymph on the lens capsule. Blood examination suggested a *streptococcal origin*, and antistreptococcic serum was given. This was followed by slight rise of temperature and evidence of reaction in the eye; and twenty-one hours after the injection there had been great improvement. The right pupil had almost fully dilated, and in the left the cornea was clearing. At the end of forty-eight hours the right pupil was normally, and the left three-fourths dilated; and in four days the mass in the anterior chamber had almost entirely disappeared. During this time no other medicine had been given. Full vision was recovered in both eyes.

In 3 cases of *gonorrheal iritis* reported by Butler,¹ injections of anti-gonococcal serum were followed by very rapid and satisfactory cures. In 2 of the cases there was evidence of serum poisoning, urticaria, and some irritation of the skin. Shumway² reports that a patient who had suffered in five years 4 recurrences of gonorrheal iritis with arthritis, had promptly recovered after injections of the Neisser bacterin, and had remained well for two years. In discussing the above case, Posey, from an experience of 5 cases, remained unconvinced of the value of gonorrheal vaccines in iritis, and Buchanan told of a failure of the vaccine in gonorrheal ophthalmia in an adult.

Uveitis. An epidemic of *cyclitis* with *vitreous opacities*, deposits on Descemet's membrane, slight tendency to iritis, and increased tension of the eyeball with pyrexia, pains in the limbs and joints, and severe aching of the eyeballs is reported by Lea.³ These cases improved rapidly with clearing up of the vitreous opacities, under the use of salicylic acid and potassium bicarbonate in doses of 15 to 20 grains of each. In cases not so treated, the opacities continued.

The relations of nasal obstruction to uveitis, and especially to descemetitis, are discussed by Reber,⁴ who reports a series of cases justifying the conclusion that such a connection is likely. He thinks constitutional conditions should be excluded by modern laboratory methods before sinusitis is accepted as the cause. But, even in the absence of disease in the nose, depletion of the nasal mucosa tends to shorten the uveal disease, and lessen the danger of recurrence.

Cases of so-called *heterochromic cyclitis* have been reported by Butler and Stephenson.⁵ Butler's case was peculiar in that the eye with the darker iris became the seat of cataract. Its extraction was followed by glaucoma that greatly reduced the vision. In Stephenson's case, the

¹ Ophthalmoscope, ix, 824.

² College of Physicians, Philadelphia, Section on Ophthalmology, December 21.

³ Ophthalmoscope, ix, 183.

⁴ Transactions of the American Academy of Ophthalmology and Otolaryngology, 1911.

⁵ Ophthalmoscope, ix, 501, 631.

sight was lost without pain or inflammation, and, as usual, the cataract occurred in the eye with the light iris.

Villard¹ reports the cases of two children, aged respectively three and four months, who suffered from severe gastro-enteritis, and at the height of the attacks an insidious *iridochoroiditis* began, which went on to complete blindness with slight shrinking of the eyeball. In each case the condition was unchanged three years later, and the other eye remained normal. Villard ascribes the condition not to microbial invasions, but to the influence of toxins of gastro-intestinal origin. Chevallereau² records 4 cases, 3 under observation for many years, in which *chronic disseminated choroiditis* appeared to be *influenced by menstruation*. This was shown by both variations in the acuteness of vision and ophthalmoscopic changes. He suggests a toxic agent developed in the corpus luteum, the poisoning varying from time to time with the cause. In 5 cases reported by Galezowski and Berche,³ uveitis developed or became worse after the removal of the ovaries. Vision was not reduced below $\frac{1}{10}$ in any case, and improved under treatment with ovarian extract, in one patient to normal in both eyes.

Sympathetic Ophthalmia continues to be a battlefield for theories of pathology. It is important for the gravity of its results, but equally important for the influence that hypotheses propounded regarding it have upon the understanding of pathological processes in general. Its causation by a specific microbe has been sharply contested by Guillery⁴ and Elschmig,⁵ and vigorously upheld by Reis,⁶ von Hippel,⁷ and Deutschmann.⁸ Guillery injected into the eyes of rabbits ferments like trypsin, and filtered cultures of bacteria. He thus produced severe reaction, and, on examination of the eyes, found microscopic appearances closely related to those that have been found in early sympathetic ophthalmia. He concludes that such appearances may be produced by toxic substances without the presence of bacteria. Elschmig theorizes that the injury in the exciting eye causes antigens that bring about the removal of uveal tissue, and a hypersensitiveness of the other parts of the uvea in the injured eye and in its fellow. After this preparation, some general dyscrasia due to a general infection or disease elsewhere in the body, or to an auto-intoxication, sets up an inflammation in the sympathizing eye which runs the malignant course of sympathetic ophthalmia because of the exciting uveal condition. He cites the interval always occurring between injury and sympathetic disease as

¹ Archives d'Ophthalmologie, xxxi, 461.

² Bull. Société Française d'Ophthalmologie, 1911.

³ Recueil d'Ophthalmologie, xxxiii, 97.

⁴ Archiv für Augenheilkunde, lxxviii, 242.

⁵ Graefe's Arch. f. Ophthalmologie, lxxviii, 549.

⁶ Klin. Monatsbl. f. Augenh., November, 1911, p. 625.

⁷ Graefe's Arch. f. Ophthalmologie, lxxix, 451.

⁸ Ibid., p. 500.

necessary for the development of anaphylaxis, and points out that other bilateral inflammations of the uveal tract may depend on the same factors. On the other hand, Reis thinks the appearances observed by Guillery, produced by ferments injected into the vitreous, are not like those most characteristic of sympathetic disease. Von Hippel points out, with regard to Elschmig's theory, that local anaphylaxis without general symptoms is unknown. Uveal destruction may occur after non-perforating injuries, but sympathetic ophthalmia rarely, if ever, results. Deutschmann supports the hypothesis of the migration of microbes from the injured to the sympathizing eye. He reports a case inoculation from which seemed to produce similar inflammation in the eyes of monkeys. In each case, inflammatory changes were found in the optic nerve sheaths.

A case of sympathetic ophthalmia appearing four days after the removal of the exciting eye is reported by Welton,¹ who has also collected 27 previously reported cases. In 11 of these, sympathetic inflammation has been manifest within a week after the removal of the exciting eye, and in only 1 case did it appear as long as five weeks after the enucleation. In that case it is said to have occurred at the end of two months. The danger of sympathetic inflammation then may be said to be slight, after enucleation of the exciting eye, and to have passed away entirely at the end of about a month. The results attained by treatment in such cases are very much better than those ordinarily to be hoped for in sympathetic ophthalmia. Of the above cases, 16, 59 per cent., recovered with normal vision; 7 with reduced vision, and in only 4 was vision lost.

The results of *serum treatment for sympathetic ophthalmia* are reported by Derby and Pratt.² A case of recent sympathetic ophthalmia received injections of serum taken from a patient who had suffered from the same disease a few months previously, but whose eye had become free from inflammation. The injections varied from 20 to 30 c.c., and were five in number. Some of these were followed by striking improvement. The result was normal vision, although the iris remained adherent to the lens capsule. In 3 other cases, serum from the above patient was used, but the results, although somewhat favorable, were not sufficiently definite to have much scientific value. Injections of *salvarsan* have been resorted to for *sympathetic ophthalmia* by Fleischer³ and de Ridder.⁴ The former reports 2 cases in which small injections produced no favorable changes. De Ridder used the full dose (0.6 gram) and marked improvement followed within fifteen days, vision rising from $\frac{1}{50}$ to $\frac{1}{4}$. Other cases favorably influenced are referred to by Fleischer, who still believes that the remedy is worthy of further trial.

¹ Archives of Ophthalmology, xl, 378.

² Ibid., p. 593.

³ Klin. Monatsbl. f. Augenh., March, 1911, p. 384.

⁴ Société Belge d'Ophtalmologie, No. 30, p. 31.

Pseudoglioma. Opacity of the vitreous, called pseudoglioma, occurs frequently with cerebrospinal meningitis. It also occurs after other infective fevers, but even in these cases may be due to the *Meningococcus intracellularis*. Coats and Forbes¹ report 4 cases in which bacteriological examination demonstrated the meningococcus in the vitreous and subretinal space. The patients were children ranging from four months to four and one-half years. Two of them suffered from arthritis without other evidence of constitutional disease; and two of them developed the ocular condition after an attack of measles. These authors point out that pseudoglioma is such a well-defined clinical entity that it is likely always to be due to the same organism.

Panophthalmitis. This may be caused by various organisms. Lawson² reports 2 cases, both occurring in women, caused by the *colon bacillus*, which was found in great abundance in the urine. One of the patients was put on full doses of helmitol. Vision improved rapidly, and in seven weeks reached normal. For the other patient, a vaccine of the colon bacillus was administered, and the whole process seemed to cease by magic. The first dose of 5,000,000 was given when both corneas seemed to be sloughing, and the eyes necessarily lost. Six days later a dose of 25,000,000 was given and subsequently a third and fourth injection, each doubling the preceding dose. Seven weeks from the onset, vision was restored to $\frac{6}{9}$ and $\frac{6}{36}$. In the case reported by Bentley,³ the patient was a man suffering from pyelitis and cystitis, with colon bacillus infection. Light perception was lost and the cornea became involved. The pus from the depth of the eye showed the colon bacillus.

Beauvieux and Lacoste⁴ report a case in which both eyes were lost as part of a general infection by the *pneumococcus*; and a second case in which one eye was lost without injury and without evidence of extra-ocular disease. In a case reported by Harry,⁵ the *Klebs-Loeffler bacillus* caused the loss of an eye, by panophthalmitis following cataract extraction; although at the time of operation the eye appeared normal, and the organism was not found in the nose or throat.

GLAUCOMA

Pathology. The attack of typical, primary, acute glaucoma, according to Priestley Smith,⁶ is usually produced by congestion of the uveal tract from any cause which overfills the veins of the head and eye, such as insufficiency of the heart, disturbance of the respiration, lack of exercise, nervous exhaustion, chill, or constipation. It is not simply an expres-

¹ Ophthalmoscope, ix, 310.

² Transactions of the Ophthalmological Society of the United Kingdom, xxxi, 271.

³ Ophthalmic Record, xx, 352.

⁴ Archives d'Ophtalmologie, xxxi, 727.

⁵ Ophthalmoscope, ix, 694.

⁶ Ophthalmic Review, xxx, 97; xxxi, 1.

sion of high arterial tension, nor does it originate in inflammation. It is congestive rather than inflammatory. It arises in eyes predisposed to it, and the liability increases with age. This may be through increase in the size of the crystalline lens which goes on throughout life, tending to cause a shallow anterior chamber, and to narrow the filtration angle. The shallow anterior chamber, however, may be due to pushing forward of the lens by morbid exudation, or hemorrhage in the posterior segment of the eye. Smith holds there is little evidence that typical, chronic, non-congestive glaucoma depends at the outset on vitiation of the intraocular fluids.

Zirm¹ believes that the mechanism for regulating the tension of the eyeball is to be found in the choroidal veins, and that the failure of the blood to escape from them causes congestive glaucoma. The regulative mechanism may be found in the iris, hence iridectomy exerts the curative influence. Glaucoma is rare with myopia because of the thin, poorly developed choroid. Inability of the coats of the eye to withstand the intraocular pressure characterizes both myopia and glaucoma. Story² reports 2 cases of glaucoma arising in myopic eyes. Both were subjected to iridectomy, reducing the tension of the eyeballs, and securing some improvement in the fields of vision.

Operations for Glaucoma. In a review of the newer operations for glaucoma, Weeks³ concludes that posterior sclerotomy, trephining back of the ciliary body, ciliarotomy, and anterior sclerotomy, all give relief for a time, but not permanently. Cyclodialysis reduces the tension permanently in about 50 per cent. of cases, but is apparently losing favor. He objects to operations that seek to produce incarceration of the iris tissue. He prefers the operation of Lagrange, which he has used on 70 eyes, but thinks the trephining operations are in the right direction. Elliot⁴ reports from an experience of 370 cases of simple trephining. The operation is done under local anesthesia with 4 per cent. cocain solution, after irrigating the eye with 1 to 3000 solution of mercuric chloride. A large triangular flap of conjunctiva is dissected up from above the cornea, taking care to carry the dissection quite into the corneal limbus, and to snip away all loose tissue. The trephine, which should be 1.5 or 2 mm. in diameter, is applied as far forward as possible, making the greater pressure on the corneal margin. When the button remains adherent by one margin it may be seized with forceps and snipped loose with scissors. If the iris bulges into the opening, it is to be snipped to allow escape of vitreous. Then if it does not go back, the piece should be excised. The management of the iris is easier if the opening be large. In 3 of the cases seen a year or more

¹ Graefe's Arch. f. Ophthalmologie, lxxix, 96.

² Ophthalmic Review, xxx, 225.

³ Ophthalmic Record, xxi, p. 15.

⁴ Ophthalmoscope, ix, 409; Ophthalmology, vii, 393.

after operation, the tension remained normal or below. In no case has subsequent hemorrhage or detachment of the retina been observed, although hemorrhage is liable to occur at the time of operation, as it may when the eye is opened by any other method.

THE CRYSTALLINE LENS AND VITREOUS

Shape of Lens. The practical study of the position and form of the crystalline lens in the living eye, by means of a phakometer, is the subject of a paper by Howe.¹ He finds that the axis of the lens, instead of passing through the centre of the cornea, as commonly represented, points anteriorly more to the temporal side, and usually slightly downward. During accommodation the entire lens moves slightly downward, and the posterior surface becomes slightly more convex throughout, while the anterior surface projects forward at the centre in a conical bulging.

Cataract. CONGENITAL CATARACT. Something of the importance of heredity in causing congenital cataract is indicated by statistics published by Brown.² Among 66 admissions to the Ohio State School for the Blind he found 7 family groups, including 15 patients; and the imperfect records obtained probably show the proportion much lower than it really should be. Collomb³ reports of a family traced through three generations, in which half of the children suffered from cataract. Gilbert⁴ reports a case of total congenital cataract anatomically examined. He found it associated with slight microphthalmos, persistent hyaloid artery, and anomalies of the retina. He considers the accident of indefinite intrauterine inflammation an insufficient explanation of such cases.

CATARACT ASSOCIATED WITH GENERAL DISEASE. The association of *uncinariasis* (hookworm disease) with cataract, first pointed out by his father, is confirmed by Calhoun,⁵ who places on record 3 cases, in which the general condition was carefully studied, and he has seen others in which the connection was probable. The patients were all under forty-four years of age, and had enjoyed good sight until the symptoms of hookworm disease developed. This disease seemed to have caused in each case extreme anemia, and to the anemia Calhoun is disposed to ascribe the development of cataract.

A case of cataract occurring in a man, aged thirty-nine years, who was suffering from *atrophic myotonia* is recorded by Ormond.⁶ Both

¹ Transactions of the American Academy of Ophthalmology and Otolaryngology, 1911, p. 223.

² Ophthalmoscope, ix, 259.

³ Archives d'Optalmologie, xxxi, 549.

⁴ Proceedings of Heidelberg Ophthalmological Congress, 1911, p. 37.

⁵ American Journal of Ophthalmology, xxviii, 257.

⁶ Transactions of the Ophthalmological Society of the United Kingdom, xxxi, 214.

the father and mother of this patient had been operated on for cataract. Greenfield¹ published the notes of a family in which, of 8 members affected with myotonia, 4 had cortical cataract. Clearly it should be borne in mind that myotonia atrophica is liable to be associated with cataract, and the further study of such association may throw light upon the pathology of both conditions.

TRAUMATIC CATARACT. Ortin² reports of two men injured by the same *electric discharge*. Both suffered from cataract; the one total in one eye; the other with partial cataract in both eyes. Removal of the total cataract gave good vision. Charles³ has reported the case of a boy, aged eight years, struck on the forehead by a sapling. His vision was reduced to $\frac{1}{120}$, and both lenses showed striation and a diffuse opacity resembling zonular cataract. Five months later the cataract had wholly disappeared and vision had risen to $\frac{2}{15}$ in each eye.

For many cases of traumatic cataract Donovan⁴ urges the removal of the crystalline lens at the earliest moment that it can be done with safety to the patient, after it becomes certain that cataract will ensue. Donovan, however, emphasizes the fact that every case of ocular injury must be treated in accordance with the indications of the individual case.

Spontaneous absorption of traumatic cataract is not impossible. Cauvin⁵ records cases of spontaneous absorption of the lens after injury in a boy, aged seven years, and in a man, aged twenty-one years. In a man, aged sixty-three years, suffering from complete senile cataract, an attempted extraction resulted in the subluxation of the lens after the opening of the capsule. The operation could not be completed. But in seven months the cataract had been completely absorbed, and vision of $\frac{4}{10}$ was obtained with a correcting lens. It is to be remembered that senile cataract may undergo spontaneous absorption. A case of the kind occurring in a woman, aged seventy years, is reported by Ewing.⁶

CATARACT OPERATION. Ewing⁷ advocates a return to the *lance-shaped knife* for making the incision for cataract, and he has planned a knife which will give the proper length of section without the point coming in contact with the opposite part of the cornea. The part of the blade toward the handle being curved to correspond to the corneal margin, serves as an effective guide, showing when the proper length of incision has been made. For such an operation, he prefers a double fixation forceps applied to the conjunctival limbus on either side, 3 or 4 mm. below the horizontal meridian.

¹ Review of Neurology and Psychiatry, April, 1911.

² Arch. de Oftalm. Hispano-Americanos, xi, 521.

³ American Journal of Ophthalmology, xxix, 20.

⁴ Transactions of Section on Ophthalmology, American Medical Association, 1911, p. 96.

⁵ Archives d'Ophthalmologie, xxxi, 683.

⁶ American Journal of Ophthalmology, xxviii, 50.

⁷ Ibid., p. 65.

Van Lint,¹ to protect the corneal incision from infection dissects up the conjunctiva 8 or 10 mm. back from the upper half of the limbus. He then introduces a suture on either side of the cornea in such a way that, when tightened, the two sutures will draw the conjunctiva down upon the upper half of the cornea. The cataract extraction is then made in the ordinary manner. After the iris has been replaced, the sutures are tightened and tied. The corneal incision is thus entirely covered by conjunctiva. The sutures fall out after five or six days, and the conjunctival flap rapidly retracts to its normal position.

In the recent symposium and discussion on the extraction of senile cataract in the Chicago Ophthalmological Society, neither of the above modifications was alluded to, and, in general, decided modifications of the technique of this operation find favor with operators other than those who have devised them, only as possible resources that may prove serviceable, or suggestive of serviceable modifications of the operation to meet the special indications of emergencies.

The *Smith operation* for intracapsular extraction of the lens has now been under consideration by ophthalmologists for more than eight years.² Outside of India it has been most widely practised in the United States, from whence six or eight prominent ophthalmologists have journeyed to India to study and practise the operation in Smith's own clinic. These operators have usually been favorably impressed with the operation. But all admit that it is a more difficult operation than extraction with capsulotomy, and not applicable to all cases. The recent canvas made by Vail³ shows that, of American operators, 85 have not been sufficiently convinced of its merit to attempt it. Ten have tried it, but only once. Nine have tried it from two to six times, and only 6 have performed 50 or more extractions in the capsule. It seems especially suited to cases of unripe swollen cataract; and in such cases to be relatively easier of performance. But even for these cases the advocates think it should be restricted to the few operators of large experience, who have specially trained themselves for its performance.

Vitreous Hemorrhage and Opacities. Axenfeld⁴ reports 3 cases of hemorrhage into the vitreous followed by proliferating retinitis and vascular changes. From a general consideration of such cases, he feels certain that *tuberculosis* is a cause for these lesions of greater importance than is generally supposed; although he does not claim that this is the cause in all cases. Woods,⁵ who reports 5 cases of his own, and has collected the experience of other observers, embracing in all 48 eyes, recognizes that, in young people, the ocular lesions may be due to tuber-

¹ La Clinique Ophthalmologique, July, 1911, p. 338.

² PROGRESSIVE MEDICINE, June, 1904, p. 319.

³ Symposium on Extraction of Senile Cataract, Chicago, Cleveland Press, 1912.

⁴ Bull. de la Société Belge d'Opht., No. 29, p. 155.

⁵ Section on Ophthalmology, American Medical Association, 1911, p. 226.

culosis or to some other infection or disease capable of producing vascular changes. Of the 48 eyes in question, 20 recovered practically normal vision; 7 obtained some improvement; 7 developed retinitis proliferans, of which 3 became totally blind; and 14 were lost; 4 from secondary glaucoma, 1 from shrinking of the globe, and 9 from causes not specified. Cords,¹ who reports 6 cases of recurring retinal hemorrhage and proliferation, is inclined to minimize the importance of tuberculosis and other infections, falling back on the explanation of some obscure vascular disease involving the choroid and retina.

For the *treatment of vitreous opacities*, Elschnig² recommends a removal of a portion of the vitreous and its replacement by physiological salt solutions. He has tried the method on 15 eyes of 14 patients. From 0.5 to 0.8 c.c. of vitreous were removed. The salt injections were generally very well tolerated. In 4 eyes with opacity following hemorrhage, but which had remained unchanged for many months, the vitreous was cleared up so as to permit a good view of the fundus; and the vision, previously reduced to light perception, was correspondingly improved. In one case of proliferating retinitis, nearly normal vision was obtained. In opacity following iridocyclitis, the results were much less favorable; and after traumatic hemorrhage and staphylococcus infection, no benefit was observed. The injections were usually well borne, but in a few cases there was iritis with a small hypopion. In 1 case, increased tension ensued. The method was recommended for further trial in vitreous opacities of long standing that cause practical blindness.

RETINA, OPTIC NERVE, AND TRACTS

Photophobia. Fuchs³ emphasizes the fact that it is not so much the brightness of the light to which the retina is exposed, as the suddenness of the exposure which causes the unpleasant effects known as photophobia. The pain of sudden exposure to strong light he thinks is due to dragging on the nerves of the iris by forcible contraction of the pupil. It may be experienced by normal eyes suddenly exposed to bright light. But in his own case it was prevented by use of homatropin that kept the pupil from contracting.

For *protective glasses* in most cases at low altitudes, smoke-colored ones are best. They reduce all the visible light rays, and any glass somewhat lessens the ultra-violet rays. It is only for high altitudes, exposure to polar snow fields, or certain forms of electric light that yellow or greenish-gray glasses, which shut off the violet and ultra-violet light, are indicated. For it is only in such conditions that

¹ Zeitschrift f. Augenheilkunde, xxvi, 508.

² Transactions Heidelberg Ophthalmological Congress, 1911, p. 11.

³ Wiener klinische Wochenschrift, 1912, p. 33.

ultraviolet rays are received upon the eye in large quantity, and need to be especially guarded against.

Dazzling, Fuchs thinks, depends on hyperesthesia of the retina, and on unfocussed light reaching the retina; especially from opacities in the cornea or crystalline lens. Even in normal eyes there may be sufficient opacity in the media to cause a sensation of dazzling; and in very bright light sufficient enters the eye through the coats outside the pupil to cause the sensation of dazzling. This is especially distressing in albinism.

Retinal Hemorrhage. Rogers¹ classifies his cases under six heads: (1) Retinal apoplexy from (a) rupture of vessels, (b) diapedesis; (2) simple retinitis secondary to apoplexy; (3) hemorrhagic retinitis; (4) albuminuric retinitis; (5) diabetic retinitis; (6) chorioretinitis. Of 240 cases of retinitis he has been able to follow 187, of which 113 terminated fatally within a few years. The deaths included 78 per cent. of the cases of albuminuric retinitis and 55 per cent. of hemorrhagic retinitis. Of the 74 patients still living, 46 per cent. were in poor health, suffering from the vascular or renal diseases which had caused death in the cases already ended. He finds that duration of life in albuminuric retinitis increases with the age of the patient, the younger the patient the worse the prognosis as to duration of life.

Albuminuric Retinitis. The retinal changes in this condition have been the subject of microscopic studies by Semple.² He found the white masses in the retina due to exudate, which early gave the reactions of fibrin undergoing metamorphosis into a hyaline material. At this stage the retina is practically intact, and in no instance could fat be demonstrated, or any signs of fatty degeneration of the supporting fibers of Mueller perceived. Contradictory observations he would explain by the greater duration of the disease. Semple renews the statement of his belief that certain bodies found in the nerve fiber layer are degenerated ganglion cells that have migrated somewhat from their normal position. This displacement he thinks may be accounted for as the effect of edema which takes place from the small retinal vessels, at the outer border of the inner nuclear layer. By this exudation the cells are pushed into the nerve fiber layer, become soaked with albuminous fluid, and eventually undergo the hyaline changes described.

Disturbances of Field of Vision. It has been pointed out by Fuchs³ that *central scotoma accompanying tabes* is commonly attended by some enlargement of the blind spot, tends to extend to the blind spot and is likely to be accompanied from the first by some contraction of the visual field. These associated conditions of the visual field distinguish the central scotoma of tabes from that of tobacco or alcohol amblyopia.

¹ Transactions of the Section on Ophthalmology, American Medical Association, 1911, p. 41.

² Transactions of American Ophthalmological Society, xii, 817.

³ Ibid., xii, 718.

Fuchs has also noted, in a few cases, a distinct bitemporal hemianopsia occurring in tabes; and thinks we must assume that the tabetic degeneration, while seated as a rule in the optic nerve, may exceptionally be located in the chiasm.

To bring out the full symptomatic value of the conditions of the visual field, Ronne¹ urges that the peripheral visual acuity should be tested with objects of different sizes, which will give fields showing corresponding differences in their limits. Testing the fields for colors is not a sufficient substitute for this multiple testing of the form field. The boundary of the field for a test object of a certain size, has been called an isopter. The crowding together of isopters that should be normally well separated, points definitely toward disease. So does a disproportionate limitation of the field for colors, as compared with the field for form, taken with an object of corresponding size. Rönne gives 11 cases of tabetic optic atrophy, in which the disproportion of the visual fields furnished a fairly correct prognosis as to the subsequent progress of the case.

Retrobulbar Neuritis. This is an important cause of sudden loss of sight by practically blotting out the centre of the field of vision. The prognosis for restoration of vision is generally good, if the cause be temporary or capable of removal. A few years ago the origin of this trouble was often very obscure. It is now recognized that, in a considerable proportion of cases, retrobulbar neuritis is associated with *disease of the accessory sinuses* of the nose. A case of the kind is reported by Hett and Henderson,² in which removal of nasal obstruction was practised, and recovery was complete. Dutoit³ reports 2 cases in which the retrobulbar neuritis appeared to be of *dental origin*. He himself suffered from periostitis in the region of the right superior premolars, and six days later developed a central scotoma in the right eye. The tooth was extracted, the gum scarified, leeches applied back of the ear, and in a few days the process cleared up. The other case was that of a woman who suffered from facial neuralgia and vision diminished one-half, with definite hyperemia of the optic disk and retinal veins. The wisdom teeth had not erupted, but were found lying in eroded cavities surrounded by granulation tissue. They were removed and the cavities scraped, and rapid disappearance of the neuralgia and scotoma followed. In both of these cases, nasal examination revealed only hyperemia and slightly increased secretion over the inferior turbinates. Kennedy⁴ reports a series of cases in which retrobulbar neuritis, developing before a general papilledema, constituted a diagnostic sign of tumors and abscess in the frontal lobe. The neuritis occurred on the same side as the cerebral lesion.

¹ Klin. Monatsbl. f. Augenh., February, 1911, p. 154.

² Ophthalmic Review, xxx, 107.

³ Archiv f. Augeneheilkunde, lxxviii, 331.

⁴ Amer. Jour. Med. Sci., September, 1911, p. 355.

Toxic Amblyopias. Krueger¹ finds that in *tobacco and alcohol amblyopia* there are vascular lesions of the arteries and veins running to the macula, which resemble those seen in *arteriosclerosis*. The outlines of the arteries are hazy and irregular, with contractions of the lumen. This haze shows on the optic disk where an artery crosses a vein, and occasionally the veins are interrupted by pressure of an underlying artery. Krueger believes that these are essential changes in this form of toxic amblyopia, the disease of the macular arteries causing disease of the papillomacular fibers. Scalinci² regards chronic arteriosclerosis as the condition underlying the retrobulbar neuritis commonly ascribed to chronic poisoning by alcohol and tobacco. He reports 20 cases, in all of which he found evidence of cardiovascular disease and increased arterial pressure. In 4 cases that he regards as similar, there was no history of use of either alcohol or tobacco.

Starting from the experiment of neutralizing the effects of alkaloids by *injections of lecithin*, De Waele³ has treated 4 cases of tobacco amblyopia by subcutaneous injections of this substance. In 2 cases detailed, the results were striking; great visual improvement occurring in 11 days and 7 days respectively. Danis⁴ reports on 5 cases subjected to this treatment. Two cubic centimeters of a 5 per cent. oily solution of lecithin were administered about once in two days by intramuscular injection. The results obtained were variable and did not justify the drawing of conclusions.

Two cases of *quinine amblyopia* reported in the last year have points of especial interest. Tyson's⁵ patient, a colored man, aged twenty-three years, suffering from typhoid pneumonia, received 120 grains of the sulphate in one day. Next morning he could not see, but was given 20 grains more. Light perception returned within a week; fourteen months later he had vision of $\frac{2}{20}$, but the fields were narrowed to about 5 degrees. It seemed like "looking through a gun-barrel." At this time treatment was begun with potassium iodide and strychnine. Islands of vision appeared in the blind part of the field, and the fields expanded so as to include them; and this improvement continued up to twenty-one months after the poisoning. Central vision was $\frac{2}{15}$, although the optic nerves presented the appearance of optic atrophy. Keiper⁶ reports a man, aged seventy-five years, who, after hard drinking, had taken 120 grains of quinine sulphate, and was totally blind next morning. At the end of eight days vision was $\frac{2}{10}$, and improved within a month to $\frac{2}{40}$. The optic disks still appeared atrophic with absence of small vessels. A case of blindness following injections of *hectin* is reported

¹ Klin. Monatsbl. f. Augenh., 1911, i, 579.

² Archives d'Ophthalmologie, xxxi, 225.

⁴ Bull. de la Société Belge d'Opht., No. 32, p. 67.

⁵ Archives of Ophthalmology, xl, 424.

⁶ Ophthalmic Record, xx, 604.

³ Ibid., p. 308.

by Gaucher.¹ There was at first great reduction of the visual field, with some impairment of central vision. A week later he could see scarcely anything, and subsequently became entirely blind. The ophthalmoscopic examination, four months afterward, showed uniform pallor of the optic disks and contraction of the vessels, the appearances of simple optic atrophy. Hallopeau and Dainville² saw temporary obscuration of vision after seventeen injections, each containing 20 cgr. of hectin, an amount which Gaucher criticised as excessive.

Optic Neuritis. It is generally recognized that the acute specific fevers are liable to leave the eyes "weak." Often nothing can be certainly recognized beyond temporary asthenopia. But in a considerable number of cases organic disease occurs, and may be of very serious character. Griscom³ reports the case of a girl, aged eleven years, who, three weeks after an attack of *measles* which ran a mild course, found that her right eye was blind; and four days later that her left eye was becoming dim. When seen, the right eye had lost all light perception, and the pupils did not react to light. The left eye had vision reduced to light perception, and the pupil reacted very sluggishly to light. In both eyes there was optic neuritis, the swelling of the disks amounting to 4 D. The arteries were small, the veins dilated and tortuous. Under hot packs and calomel, grains 0.1 every hour, vision rose in thirty days to counting fingers with each eye. After this gradual improvement continued, until at the end of eight months vision was quite normal in each eye. From his review of previously reported cases, Griscom concludes that optic nerve changes following measles may be associated with cerebral involvement or meningitis; or, as in this case, the optic neuritis may occur without other local or general symptoms.

Decompressive Trephining for Choked Disk. The resort to cerebral decompression for choked disk connected with increased intracranial pressure, is the subject of an elaborate paper by Velter,⁴ who collects from the French literature some 12 published cases, and adds 4 observed by himself. He concludes that in choked disk with intracranial hypertension, decompressive craniectomy should be resorted to if mercurial treatment and lumbar puncture do not promptly cause improvement. The operation should be done soon after it is ascertained that the swelling of the optic disk is progressive. But it is possible that some improvement may be obtained even much later. After the trephining the symptoms diminish rapidly, in two or three days the acuteness of vision is ordinarily improved. But the prognosis, both visual and otherwise, will vary greatly with the cause and exact condition present.

De Schweinitz⁵ reviews the relation of cerebral decompression to the relief of the ocular manifestations of increased intracranial tension. He

¹ Presse Méd., June 17, 1911.

² Recueil d'Ophthalmologie, xxxiii, 218.

³ Annals of Ophthalmology, xxi, 42.

⁴ Archives d'Ophthalmologie, xxxi, 129. ⁵ Annals of Ophthalmology, xx, 271.

points out that the best results are obtained by early decompression. The indications for operation depend not alone on the ophthalmoscopic examination, but also on the visual field, the size of the blind spot, the light sense, and the periods of temporary obscuration of vision. He suggests all *head injuries* should be carefully investigated from the ophthalmoscopic standpoint. While neuroretinitis of albuminuria and anemia, pointing to cerebral edema, may be regarded as indications for palliative trephining, the advisability of such a measure must be regarded as doubtful.

The *permanence of the visual result* obtained by decompression is illustrated by a series of 14 cases reported by von Hippel.¹ Seven of his patients were still living after intervals of from four months to two years, the average having been ten and one-half months. In all of these cases the existing vision had been retained or improved. Of the patients who had lived two weeks to one year after operation, 3 showed improvement or retention of some vision up to the time of death. The length of time that vision may be retained is illustrated by a case reported by Lloyd and Spellissy.² At the time of operation vision was greatly impaired, so that the pupils did not react to light. But after operation it was largely regained; and at the end of five years was still $\frac{4}{15}$ and $\frac{4}{12}$, although the choking of the disk had been followed by the ophthalmoscopic appearances of post-neuritic optic atrophy.

Optic Atrophy. A case of atrophy following *traumatic asphyxia* is reported by Parker,³ with a brief review of previously reported cases. A man, aged twenty-three years, was crushed by a weight striking his shoulder, and was brought into the hospital with face and neck black from venous congestion, and total loss of vision in the right eye. The left eye remained normal. The ophthalmoscope showed the right optic nerve white, with great engorgement of the retinal veins. A month afterward the nerve was evidently atrophic. In this, as in other reported cases, the injury to the optic nerve seems to have been due to hemorrhage, the extent and location of the hemorrhage determining the exact symptoms present.

Several cases of *blindness following loss of blood* have been reported in the last year. Moore⁴ reports 3 cases. One was a woman, aged fifty-three years, who had been vomiting blood for five days. Fifteen hours afterward she noticed loss of sight in the left eye, and three days later woke to find herself completely blind. When seen on the seventh day, there was no light perception or reaction of the pupils to light. The optic disks were pale and hazy. The blindness was permanent, and the disks became atrophic. Another woman, aged thirty-four years, had

¹ Archives of Ophthalmology, xl, 159.

² Journal of Nervous and Mental Disease, May, 1911.

³ Archives of Ophthalmology, xl, p. 159.

⁴ Transactions of the Ophthalmological Society of United Kingdom, xxxi, 39.

a miscarriage followed by much hemorrhage. Next day vision was impaired and gradually grew worse until in ten days she could not see a lighted match held before her eyes. This continued two weeks, then light perception returned and gradually improved, until at the end of eight weeks she could see hand movements with the right eye, and $\frac{6}{18}$ with the left. The optic disks were pale, with indistinct edges. A man, aged forty-one years, extremely anemic, with bleeding piles, had vision that had been failing for four weeks, and was reduced to counting fingers at one foot, and $\frac{3}{60}$ with a central scotoma. After operation, his general condition improved greatly, but his vision remained unaltered. Zani¹ reports a case of great impairment of vision following gastric hemorrhage. It subsequently improved, but only to counting fingers.

Hegner² records 3 cases of blindness following gastric hemorrhage. In 2, the blindness was total. In the third, some vision was retained in the right eye. The ophthalmoscope showed signs of optic atrophy. In discussing Hegner's paper, Schmidt-Rimpler stated that, in blindness following hemorrhage, in several cases he had observed retention of ability to count fingers in the periphery of the field.

Darier,³ reporting 2 cases, one following uterine hemorrhage and the other after epistaxis, inclines to class them with ischemia of the retina from other causes, such as obstruction of the retinal vessels; and from that point of view discusses their *treatment*. He recommends the local application of dionin, prolonged massage of the eye, hyperemia produced by the Bier method, paracentesis of the anterior chamber, iridectomy, or retrobulbar injections of mercuric chloride, 1 to 2000, or mercuric cyanide, 1 to 1000. It seems important to treat these cases early, since restoration of vision after a few days, or even a few hours, is very doubtful or incomplete.

Pituitary Disease is hardly to be classed among diseases of the eye, and yet the mass of well-described cases are to be found in ophthalmic literature. The visual symptoms seem to lead to definite recognition and diagnosis; although early failure of sexual functions, and indefinite changes in physique may be traced back, often for several years, when the character of the case has been once recognized. The exact pathological changes that give rise to the symptoms are still very obscure. Fisher,⁴ who reports 6 cases, bases the diagnosis largely upon changes in the field of vision, temporal *hemianopsia*, generally bitemporal, but not often exactly limited to the half fields, and liable to go on to complete blindness through optic atrophy; and upon skiagrams showing changes in the sella turcica. The sense of smell may be absent, but often is not.

¹ Recueil d'Ophthalmologie, xxxiii, 243.

² Klin. Monatsbl. f. Augenh., January, 1912, p. 119.

³ La Clinique Ophthalmologique, xvii, 506.

⁴ Transactions of the Ophthalmological Society of United Kingdom, xxxi, 51.

De Kleijn,¹ who reports 4 cases, has made an elaborate analysis of the symptoms. He finds the extent of the visual fields in tumor of the hypophysis is not liable to great temporary variations, but the contraction of the field is of great practical significance in estimating the ultimate result. While the fields show a tendency to temporal hemianopsia, they are atypical, and may vary in almost any direction. Fisher points out that re-entering angles are rare. De Kleijn has encountered an island of retained vision in the blind portion of the field, and observed that the field for blue may be as large as that for white. Two of his patients mentioned *blue vision* spontaneously, a symptom apparently not recorded by other observers. Visual hallucinations have been noted. The pupil reactions are commonly lost with the fields of vision. While choked disk may occur, the case when seen usually presents the symptoms of optic atrophy. As bearing upon the advisability of radical operative treatment, the life duration of 124 reported cases is of value; 22 died in six months; 26 more within a year; 24 in the second year; 11 in the third year; and 41 in from four to thirty years. Operation is attended with very great risk, and for many cases is not to be considered. Nevertheless, a careful study of symptoms may show when the risk of early death, or complete disability, will justify resort to such a radical measure.

More immediately applicable is the feeding with the proper extracts. Lafon² saw benefit from the administration of thyroid and ovarian extracts; but the symptoms promptly returned when these were suspended. Fisher thinks something is to be hoped from pituitary extract, and especially an extract from the anterior lobe of the hypophysis. But the efficient application of such therapeutic measures must wait upon accurate diagnosis, and this upon the more general recognition of these cases.

¹ Graefe's Archiv f. Ophthalmologie, lxxx, 307.

² Recueil d'Ophthalmologie, xxxiii, p. 65.

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